United Healthcare Medicare Advantage

Clinical Information for Medical Necessity Review

CMS Policy Hierarchies & Application

Guideline Definitions

GENERAL	
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Cardiac Implantable Devices (CID)	Chest
Head	Musculoskeletal
Neck	Oncology
Pelvis	Peripheral Nerve and Neuromuscular Disorders (PNND)
Peripheral Vascular Disease (PVD)	
Spine	

PEDIATRIC	
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Clinical Information to Establish Medical Necessity Guideline

Guideline

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The clinical guidelines apply an evidence-based approach to evaluate the most appropriate medically necessary care for each individual. This evaluation requires submission of legible medical records pertinent to the test or treatment being requested by the provider.

If the medical records provided do not provide sufficiently detailed information to understand the individual's current clinical status or cannot be read, then medical necessity for the request cannot be established and cannot be approved.

Specific elements of an individual's medical records commonly required to establish medical necessity include, but are not limited to:

- Virtual or in-person clinical evaluation which includes a detailed history and physical examination since the onset or change in symptoms
- Laboratory studies
- Imaging studies
- Pathology reports
- Procedure reports
- Reports from other providers participating in treatment of the relevant condition

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Medicaid and Medicare Hierarchy and Application

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Medicaid and Medicare Hierarchy and Application
Medicaid
Medicare Policy
Medicare/Medicaid Dual Membership

CMS Policy Hierarchies and Application

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Medicaid and Medicare Hierarchy and Application

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Medicaid

Medicaid Hierarchy

1. Medicaid state-specific policy
2. The evidence-based guidelines or the appropriate alternative guideline utilized by a program/health plan in place of these guidelines
3. Early and Periodic Screening, Diagnostic and Treatment (EPSDT) guidelines should also be reviewed for individuals under 21 years of age as applicable for coverage determination

Application of Medicaid Policy

The state Medicaid policy will be reviewed first to determine if the information provided is instructive to the clinical case at hand. For the purpose of this policy, sufficient clinical criteria to render a medical necessity decision is defined as the presence of a state Medicaid policy that addresses the service/procedure/test/equipment and the member condition (indication) and supplies sufficient clinically relevant detail to be instructive to the case. See the numbered items below for specific guidance:

1. State Medicaid policy addresses clinical scenario: (service/procedure/test/equipment AND member condition AND Medical Necessity criteria):
   a. Medicaid policy will be utilized and cited for determining medical necessity
   b. If specific medical necessity criteria are present in the state policy, but are limited or less detailed than eviCore or alternative guideline, the state policy would still be applied and cited, as this would be considered sufficient information to render a decision
2. State policy exists for service/procedure/test/equipment AND member condition but NO medical necessity criteria exist for this indication. The state policy would still be instructive to the case clinical scenario and Medicaid policy will be utilized and cited.
3. State Medicaid policy addresses service/procedure/test/equipment, but does NOT cover member condition in question or provide specific medical necessity criteria for this indication and does not contain relevant clinical information to be instructive to the case/clinical scenario, eviCore guidelines or alternative guidelines, as appropriate, will be utilized and cited

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a. (Example: Service is requested to address a member condition and the state policy indicates that the service is indicated for this member condition without providing specific criteria regarding under which circumstances the service would be indicated for this condition. This is considered instructive, and the state policy would be applied/cited.)

4. If no clinical information is provided with a request, the above hierarchy is still applied. If there is an applicable state-specific Medicaid policy, the Medicaid policy would be utilized and cited to request clinical information/documentation. If there is no applicable state-specific Medicaid policy, eviCore guidelines or alternative guidelines, as appropriate, will be utilized and cited

Note: The scope of this policy is to outline the default order in which policy sources will be used during a delegated medical necessity determination. The Medicaid hierarchy outlined here may be superseded by Plan- and State-specific Hierarchy policies, where applicable, based on contracts with a state Medicaid entity.

Application and citation of policy

State Medicaid Policy exists	State Medicaid policy addresses service/ procedure/test/ equipment	State policy addresses member condition and/ or is instructive to the case	State Medicaid Policy provides specific medical necessity criteria relevant to service and member condition	Application and Citation of Policy
Y	Y	Y	Y	State Medicaid policy applied and cited
Y	Y	Y	N	State Medicaid policy applied and cited
Y	Y	N	N	EviCore criteria applied and cited

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State Medicaid Policy exists	State Medicaid policy addresses service/ procedure/test/ equipment	State policy addresses member condition and/ or is instructive to the case	State Medicaid Policy provides specific medical necessity criteria relevant to service and member condition	Application and Citation of Policy
Y	N	N	N	EviCore criteria applied and cited

Medicare Policy

CMS Coverage Hierarchy: Medicare Advantage Medical Policy Development and Application

Medicare Advantage medical policies identify the clinical criteria for determining when medical services are considered 'reasonable and necessary' (medically necessary). Medicare Advantage plans are required by CMS to provide the same medical benefits to Medicare Advantage members as original Medicare.

Medicare Advantage plans must comply with national coverage determinations (NCD), local coverage determinations (LCD), and general coverage and benefit conditions included in traditional Medicare laws. This includes criteria for determining whether an item or service is a benefit available under traditional Medicare. When coverage criteria are not fully established in Medicare statute, regulation, NCD, or LCD, Medicare Advantage organizations may create publicly accessible internal coverage criteria that are based on current evidence in widely used treatment guidelines or clinical literature.

If additional criteria are needed to interpret or supplement generalized provisions within an NCD, LCD or other Medicare coverage policy, or there is flexibility allowed in the NCD/LCD, or there is no applicable NCD, LCD, or LCA (used in concert with an LCD) available to determine medical necessity, then other evidence-based criteria may be applied.

Coverage criteria are not fully established when (42 CFR 422.101(6) (i) :

(i) Coverage criteria not fully established. Coverage criteria are not fully established when:

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(A) Additional, unspecified criteria are needed to interpret or supplement general provisions in order to determine medical necessity consistently. The MA organization must demonstrate that the additional criteria provide clinical benefits that are highly likely to outweigh any clinical harms, including from delayed or decreased access to items or services;

(B) NCDs or LCDs include flexibility that explicitly allows for coverage in circumstances beyond the specific indications that are listed in an NCD or LCD; or

(C) There is an absence of any applicable Medicare statutes, regulations, NCDs or LCDs setting forth coverage criteria.

The following hierarchy is used to determine Medicare Advantage Medical Policy:

1. CMS Coverage Manuals or other CMS-Based Resource: Coverage provisions in interpretive manuals are instructions that are used to further define when and under what circumstances items or services may be covered (or not covered)
2. National Coverage Determinations (NCD)
3. Local Coverage Determinations (LCD)
4. Local Coverage Articles (LCA) may be used in conjunction with LCDs, or if the LCA is stated as 'Not an LCD reference article' within the LCD , the LCA may be cited alone.
5. EviCore's evidence-based guidelines or the appropriate alternative guideline utilized by a program/health plan in place of EviCore's guidelines.

- Rationale supporting the adoption and use of internally developed coverage guidelines: When coverage criteria are not fully established (as defined in 42 CFR 422.101(6) (i)) in Medicare policy, an NCD, or an LCD, CMS allows a Medicare Advantage Organization (MAO) to create and use internally developed coverage criteria. See 'Coverage criteria are not fully established when (42 CFR 422.101(6) (i) above on page 3 for the full definition of 'not fully established'.
- NCDs with Coverage with Evidence Development (CED) contain fully established Medicare coverage criteria for purpose of 42 CFR § 422.101(b)(6). Therefore, Medicare does not permit MA organizations to apply internal coverage criteria to limit, expand, or modify the scope of the NCD with CED (42 CFR § 422.101(b)(6), November 25, 2025).
- EviCore will exhaust all traditional Medicare policies, NCDs, and LCDs prior to using internal criteria policies. When an internally created coverage policy is utilized for a specific condition where a Medicare policy, an NCD, or LCD is not fully established, the general provisions supplemented by the internal criteria will include when the specific clinical presentation of the enrollee, for the request under review is not addressed in the Medicare coverage policy; or there are no specific coverage criteria included in a Medicare policy because the policy provides broad provisions, which may be instructive, but are not detailed enough to be used to determine the medical necessity of the request. Additionally, internal coverage policy may be used when

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Medicare policy includes statements within the policy that allow for coverage beyond what is written in the Medicare policy.

- Under the guidance outlined above EviCore's evidence-based guidelines or the appropriate alternative guideline utilized by a program/health plan in place of EviCore's guidelines, EviCore may apply internally developed clinical coverage guidelines to the request under review. Each EviCore clinical coverage policy is developed following an objective, evidence-based process based on scientific evidence, generally accepted and current standards of medical practice, and authoritative clinical practice guidelines. Each coverage policy developed and used outlines clinical benefits, addresses any clinical harm, and access to services. In addition, each member's unique clinical situation is considered in conjunction with current CMS guidelines and EviCore clinical coverage policy, as applicable.

Note: Where a Medicare Administrative Contractor (MAC) has adopted the Palmetto GBA MolDX® Program's criteria for the LCDs governing molecular and genomic tests within their jurisdiction, EviCore's Laboratory Management program will follow the MolDX criteria published by the MACs for those jurisdictions.

Medicare/Medicaid Dual Membership

Hierarchy and Application for dual eligible Medicare/Medicaid

Individuals enrolled in both Medicare and Medicaid are considered to be dually eligible. For individuals with both Medicare and Medicaid, the following hierarchy should be applied.

1. CMS Coverage Manuals
2. National Coverage Determinations (NCD)
3. Local Coverage Determinations (LCD)
4. Local Coverage Articles (LCA) – when used in conjunction with an LCD
5. Evidence based clinical policies (EviCore) or the appropriate alternative guideline utilized by a program/health plan in place of EviCore's guidelines

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Experimental, Investigational, or Unproven

Certain studies, treatments, procedures, or devices may be considered experimental, investigational, or unproven for **any** condition, illness, disease, injury being treated if one of the following is present:

- if there is a paucity of supporting evidence;
- if the evidence has not matured to exhibit improved health parameters;
- if clinical utility has not been demonstrated in any condition; OR
- the study, treatment, procedure, or device lacks a collective opinion of support.

Supporting evidence includes standards that are based on credible scientific evidence published in peer-reviewed medical literature (such as well conducted randomized clinical trials or cohort studies with a sample size of sufficient statistical power) generally recognized by the relevant medical community. Collective opinion of support includes physician specialty society recommendations and the views of physicians practicing in relevant clinical areas when physician specialty society recommendations are not available.

Medically Necessary

Healthcare services or supplies needed to diagnose, treat, or evaluate a condition or prevent an injury, illness, condition or disease that meets accepted standards of medicine based on evidenced-based clinical standards of care based on supporting evidence and/or collective opinion of support that is:

- Clinically appropriate in terms of type, frequency, extent, site, and duration, and considered effective for the individual's illness, injury or disease;
- Clinical utility of the technology, drug, device, treatment or procedure has been demonstrated for a diagnosis, treatment, evaluation or prevention of an illness, condition or disease based on evidence-based clinical standards of care;
- Not more costly than an alternative service or sequence of services that are at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of a condition;
- Not primarily for the convenience of the individual seeking medical services, health care provider, or other physicians or healthcare providers;
- Supporting evidence and/or collective opinion of support does not demonstrate that there is an alternative that is more appropriate/effective for diagnosis, treatment, or evaluation of a condition.

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Supporting evidence includes standards that are based on credible scientific evidence published in peer-reviewed medical literature (such as well conducted randomized clinical trials or cohort studies with a sample size of sufficient statistical power) generally recognized by the relevant medical community. Collective opinion of support includes physician specialty society recommendations and the views of physicians practicing in relevant clinical areas when physician specialty society recommendations are not available. Determination of medical necessity is based on specific clinical guidelines.

Not Medically Necessary

Certain studies, treatments, procedures, or devices may be considered not medically necessary if there is supporting evidence but one of the following is present:

- Not clinically appropriate in terms of type, frequency, extent, site, and duration, and/or not considered effective for the individual's illness, injury or disease;
- Clinical utility of the technology, drug, device, treatment or procedure has not been demonstrated for a diagnosis, treatment, evaluation or prevention of the specific illness, condition or disease based on evidence-based clinical standards of care;
- More costly than an alternative service or sequence of services that are at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of a condition;
- Primarily for the convenience of the individual seeking medical services, health care provider, or other physicians or healthcare providers;
- Supporting evidence and/or collective opinion of support demonstrates that there is an alternative that is more appropriate/effective for diagnosis, treatment, or evaluation of a condition.

Supporting evidence includes standards that are based on credible scientific evidence published in peer-reviewed medical literature (such as well conducted randomized clinical trials or cohort studies with a sample size of sufficient statistical power) generally recognized by the relevant medical community. Collective opinion of support includes physician specialty society recommendations and the views of physicians practicing in relevant clinical areas when physician specialty society recommendations are not available. Determination of not medically necessary is based on specific clinical guidelines.

Special Considerations for Laboratory Testing

Laboratory-based testing is defined in terms of both the underlying technology used and, the indication for testing (i.e.: syndrome, condition, etc.). This is due to the ubiquitous use of specific technologies in laboratory medicine.

References

1. **https://www.cigna.com/health-care-providers/coverage-and-claims/policies/medical-necessity-definitions** .

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2. **https://www.healthcare.gov/glossary/medically-necessary/**
3. **https://policysearch.ama-assn.org/policyfinder/detail/H-320.953?uri=%2FAMADoc%2FHOD.xml-0-2625.xml**
4. Per Compliance Internal policy: Clinical Certification of Services – Initial UM 0045:
   a. Experimental/Investigational: The use of a technology, drug, device, treatment, or procedure that has not been proven or recognized as having proven benefit in clinical medicine for any condition, illness, disease, or injury being treated.
   b. Medical Necessity: Refers to services or supplies for diagnosing, evaluating, treating or preventing an injury, illness, condition or disease, based on evidence-based clinical standards of care. Medically necessary services are accepted health care services and supplies provided by health care entities, appropriate to evaluation and treatment of a disease, condition, illness or injury and consistent with the applicable standard of care. Determination of medical necessity is based on specific clinical guidelines. (NCQA 2025 Standards; CMS; American College of Medical Quality)

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Guideline Development (Preface-1.1)

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- These evidence-based, proprietary clinical guidelines evaluate a range of advanced imaging and procedures, including NM, US, CT, MRI, PET, Radiation Oncology, Sleep Studies, Gastrointestinal Endoscopy, as well as Cardiac, Musculoskeletal, and Spine interventions.
- EviCore reserves the right to change and update the guidelines. The guidelines undergo a formal review annually. These clinical guidelines are based on current evidence supported by major national and international association and society guidelines and criteria, peer-reviewed literature, and major treatises, as well as input from health plans and practicing academic and community-based physicians.
- These guidelines are not intended to supersede or replace sound medical judgment, but instead, should facilitate the identification of the most appropriate imaging or other designated procedure given the individual's clinical condition. These guidelines are written to cover medical conditions as experienced by the majority of individuals. However, these guidelines may not be applicable in certain clinical circumstances, and physician judgment can override the guidelines.
- These guidelines provide evidence-based, clinical benefits with a focus on health care quality and patient safety.
- Clinical decisions, including treatment decisions, are the responsibility of the individual and his/her provider. Clinicians are expected to use independent medical judgment, which takes into account the clinical circumstances to determine individual management decisions.

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Benefits, Coverage Policies, and Eligibility Issues (Preface-2)

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Benefits, Coverage Policies, and Eligibility Issues (Preface-2.1)

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Medicare Coverage Policies

- See EviCore's **Medicaid and Medicare Hierarchy and Application**.

Investigational and Experimental Studies

- See EviCore's **Guideline Definitions.**

Clinical and Research Trials

- Similar to investigational and experimental studies, clinical trial imaging requests are reviewed to determine whether they meet Health Plan coverage and these evidence-based clinical guidelines.
- Imaging studies which are inconsistent with established clinical standards, or are requested for data collection and not used in direct clinical management are not considered medically necessary.

CPT® Codes

- The inclusion of any CPT® code in the clinical guidelines does not imply that the code is under management or requires prior authorization.

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References (Preface-2)

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1. Centers for Medicare & Medicaid Services. (2024, November 15). *Prospective payment systems – general information.*
2. Office of the Law Revision Counsel, U.S. House of Representatives. (2024). *42 U.S.C. § 300gg8: Coverage for individuals participating in approved clinical trials.*
3. Zeitler, E. P., Gilstrap, L. G., Coylewright, M., Slotwiner, D. J., Colla, C. H., & Al-Khatib, S. M. (2022). Coverage with evidence development: where are we now?. *The American journal of managed care*, 28(8), 382–389. https://doi.org/10.37765/ajmc.2022.88870

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Clinical Information (Preface-3.1)

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Clinical Documentation and Age Considerations

- These clinical guidelines use an evidence-based approach to determine the most appropriate procedure for each individual, at the most appropriate time in the diagnostic and treatment cycle. These clinical guidelines are framed by:
  - clinical presentation of the individual, rather than the study or procedure requested
  - adequate clinical information that must be submitted to EviCore in order to establish medical necessity for advanced imaging or other designated procedures including, but not limited to, the following:
    - Pertinent clinical evaluation by a licensed physician or advanced practice provider since the onset or change in symptoms including a detailed history, physical examination, appropriate laboratory studies, and appropriate prior imaging studies.
      - Condition-specific guideline sections may describe additional clinical information which is required for a pertinent clinical evaluation.
      - The Spine and Musculoskeletal guidelines require x-ray studies from when the current episode of symptoms has started or changed.
      - Advanced imaging or other designated procedures should not be ordered prior to clinical evaluation of an individual by the physician treating the individual. This may include referral to a consultant specialist who will make further treatment decisions.
      - Other meaningful technological contact (telehealth visit, telephone or video call, electronic mail or messaging) since the onset or change in symptoms by an established individual can serve as a pertinent clinical evaluation.
        - Some conditions may require a face-to-face evaluation as discussed in the applicable condition-specific guideline sections.
    - A recent clinical evaluation may be unnecessary if the individual is undergoing a guideline-supported, scheduled follow-up imaging or other designated procedural evaluation. Exceptions due to routine surveillance indications are addressed in the applicable condition-specific guideline sections.
  - The evidence-based approach to determine the most appropriate procedure for each individual requires submission of medical records pertinent to the requested imaging or other designated procedures.
- Many conditions affecting the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to individual

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age, comorbidities, and differences in disease natural history between children and adults.
  - Individuals who are under 19 years of age should be imaged according to the Pediatric Imaging Guidelines if discussed in the condition-specific guideline sections. Any conditions not specifically discussed in the Pediatric Imaging Guidelines should be imaged according to the General Imaging Guidelines. Individuals who are 19 years of age or older should be imaged according to the General Imaging Guidelines, except where directed otherwise by a specific guideline section.
  - The terms "male" and "female" used in these guidelines refer to anatomic-specific diseases and disease predispositions associated with the individual's sex assigned at birth rather than their gender identity. It should be noted that gender identity and anatomic-specific diseases as well as disease predispositions are not always linked. As such, these guidelines should be applied to the individual's corresponding known or suspected anatomic-specific disease or disease predisposition. At EviCore, we believe that it is important to understand how all individuals, including those who are gender-diverse, choose to identify themselves. To ensure that gender-diverse individuals are treated with respect and that decisions impacting their healthcare are made correctly and with sensitivity, EviCore recognizes all individuals with the following gender marker options: Male, Female, Transgender Male, Transgender Female, "X", and "Not Specified."

General Imaging Information

- “Standard” or “conventional” imaging is most often performed in the initial and subsequent evaluations of malignancy. Standard or conventional imaging includes plain film, CT, MRI, or US.
  - Often, further advanced imaging is needed when initial imaging, such as ultrasound, CT, or MRI does not answer the clinical question. Uncertain, indeterminate, inconclusive, or equivocal may describe these situations.
- Appropriate use of contrast is a very important component of evidence-based advanced imaging use.
  - The appropriate levels of contrast for an examination (i.e., without contrast, with contrast, without and with contrast) is determined by the evidence-based guidance reflected in the condition-specific guideline sections.
  - If, during the performance of a non-contrast imaging study, there is the unexpected need to use contrast in order to evaluate a possible abnormality, then that is appropriate.

Ultrasound Criteria

- Diagnostic ultrasound uses high-frequency sound waves to evaluate soft tissue structures and vascular structures utilizing grey scale and Doppler techniques.
- Ultrasound allows for dynamic real-time imaging at the bedside.

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  - Ultrasound is limited in areas where there is dense bone or other calcification.
  - Ultrasound also has a relatively limited imaging window so may be of limited value in evaluating very large abnormalities.
  - In general, ultrasound is highly operator-dependent, and proper training and experience are required to perform consistent, high-quality evaluations.
- Indications for ultrasound may include, but are not limited to, the following:
  - Obstetric and gynecologic imaging
  - Soft tissue and visceral imaging of the chest, abdomen, pelvis, and extremities
  - Brain and spine imaging when not obscured by dense bony structures
  - Vascular imaging when not obscured by dense bony structures
  - Procedural guidance when not obscured by dense bony structures
  - Initial evaluation of ill-defined soft tissue masses or fullness and differentiating adenopathy from mass or cyst. Prior to advanced imaging, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the individual.
- More specific guidance for ultrasound usage, including exceptions to this general guidance, can be found throughout the condition-specific guidelines.

Computed Tomography (CT) Criteria

- The AMA CPT® manual does not describe nor assign any minimum or maximum number of sequences for any CT study. CT imaging protocols are often influenced by the individual's clinical situation and additional sequences are not uncommon. There are numerous CT protocols that may be performed to evaluate specific clinical questions, and this technology is constantly undergoing development.
- CT utilizes ionizing radiation to create cross-sectional and volumetric images of the body.
  - Advantages over ultrasound include a much larger field of view and faster completion time in general. Disadvantages compared to ultrasound include lack of portability and exposure to ionizing radiation.
  - Advantages over MRI include faster imaging and a more spacious scanner area limiting claustrophobia. Disadvantages compared to MRI include decreased soft tissue definition, especially with non-contrast imaging, and exposure to ionizing radiation.
- CT can be performed without, with, or without and with intravenous (IV) contrast depending on the clinical indication and body area.
  - In general, non-contrast imaging is considered medically necessary for evaluating structures with significant tissue density differences such as lung parenchyma and bony structures, or when there is a contraindication to contrast.
  - In general, CT with contrast is the most common level of contrast and can be used when there is need for improved vascular or soft tissue resolution, including better

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characterization of known or suspected malignancy, as well as infectious and inflammatory conditions.
    - CT without and with contrast has a limited role as the risks of doubling the ionizing radiation exposure rarely outweigh the benefits of multiphasic imaging, though there are some exceptions which include, but are not limited to, the following:
        - Characterization of a mass
        - Characterization of arterial and venous anatomy
        - CT with contrast may be used to better characterize findings on a very recent (within two weeks) inconclusive non-contrast CT where the guidelines would support CT without and with contrast.
    - More specific guidance for CT contrast usage, including exceptions to this general guidance, can be found throughout the condition-specific guidelines.
- Shellfish allergy:
    - It is commonly assumed that an allergy to shellfish indicates iodine allergy, and that this implies an allergy to iodinated contrast media used with CT. However, this is NOT true. Shellfish allergy is due to tropomyosins. Iodine plays no role in these allergic reactions. Allergies to shellfish do not increase the risk of reaction to iodinated contrast media any more than that of other allergens.
- Enteric contrast (oral or rectal) is sometimes used in abdominal imaging. There is no specific CPT® code which refers to enteric contrast.
- The appropriate contrast level and anatomic region in CT imaging is specific to the clinical indication as listed in the condition-specific guideline sections.
- CT should not be used to replace MRI in an attempt to avoid sedation unless it is listed as a recommended study in the appropriate condition-specific guideline.
- There are significant potential adverse effects associated with the use of iodinated contrast media. These include hypersensitivity reactions, thyroid dysfunction, and contrast-induced nephropathy (CIN). Individuals with impaired renal function are at increased risk for CIN.
- There is increased risk of contrast use for individuals with renal insufficiency (GFR<60mL/min). The risk benefit ratio should be considered for each case, with consideration of non-contrast CT or MRI as supported in the individual condition-based guidelines.
- Both contrast CT and MRI are considered to have the same risk profile with renal failure (GFR <30mL/min).
- CT without contrast is considered medically necessary if clinical criteria for CT with contrast are met AND the individual has/is:
    - elevated blood urea nitrogen (BUN) and/or creatinine
    - renal insufficiency
    - allergies to iodinated contrast
    - thyroid disease which could be treated with I-131

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  - diabetes
  - very elderly
  - urgent or emergent settings due to availability
  - trauma
- CT is superior to other imaging modalities in certain conditions including, but not limited to, the following:
  - Screening following trauma
  - Imaging pulmonary disease
  - Imaging abdominal and pelvic viscera
  - Imaging of complex fractures
  - Evaluation of inconclusive findings on Ultrasound or MRI, or if there is a contraindication to MRI
- More specific guidance for CT usage, including exceptions to this general guidance, can be found throughout the condition-specific guidelines.

Magnetic Resonance Imaging (MRI) Criteria

- The AMA CPT® manual does not describe nor assign any minimum or maximum number of sequences for any MRI study. MRI protocols are often influenced by the individual's clinical situation and additional sequences are not uncommon. There are numerous MRI sequences that may be performed to evaluate specific clinical questions, and this technology is constantly undergoing development.
- Magnetic Resonance Imaging (MRI) utilizes the interaction between the intrinsic radiofrequency of certain molecules in the body (hydrogen in most cases) and a strong external magnetic field.
  - MRI is often superior for advanced imaging of soft tissues and can also define physiological processes in some instances (e.g., edema, loss of circulation [avascular necrosis (AVN)], and increased vascularity [tumors]).
  - MRI does not use ionizing radiation, and even non-contrast images have much higher soft tissue definition than CT or Ultrasound.
  - MRI typically takes much longer than either CT or Ultrasound and for some individuals may require sedation. It is also much more sensitive to individual motion that can degrade image quality than either CT or Ultrasound.
- MRI Breast and MRI Chest are not interchangeable, as they focus detailed sequences on different adjacent body parts.
- MRI may be utilized either as the primary advanced imaging modality, or when further definition is needed based on CT or ultrasound imaging.
- Most orthopedic and dental implants are not magnetic. These include hip and knee replacements; plates, screws, and rods used to treat fractures; and cavity fillings. Yet, all of these metal implants can distort the MRI image if near the part of the body being scanned.

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  - Other implants, however, may have contraindications to MRI. These include the following:
    - pacemakers
    - ICD or heart valves
    - metal implants in the brain
    - metal implants in the eyes or ears
    - infusion catheters and bullets or shrapnel
  - CT can therefore be an alternative study to MRI in these scenarios.
- The contrast level and anatomic region in MRI imaging is specific to the clinical indication, as listed in the specific guideline sections.
- MRI utilizing Xenon Xe 129 (CPT® C9791) for contrast is considered investigational and experimental at this time. MRI with or with and without contrast in these guidelines refers to MRI utilizing gadolinium for contrast.
- MRI is commonly performed without, and without and with contrast.
  - Non-contrast imaging offers excellent tissue definition.
  - Imaging without and with contrast is commonly used when needed to better characterize tissue perfusion and vascularization.
    - Almost all current MRI contrast agents involve binding of gadolinium molecules, a heavy metal with paramagnetic properties, to a carrier molecule/cage which causes T1 signal shortening and increased signal on T1 weighted images.
    - Some specialized gadolinium and non-gadolinium contrast agents are available and are most commonly used for characterizing liver lesions.
  - MRI with contrast only is rarely considered medically necessary and is usually used to better characterize findings on a recent inconclusive non-contrast MRI, commonly called a completion study.
  - More specific guidance for MRI contrast usage, including exceptions to this general guidance, can be found throughout the condition-specific guidelines.
- MRI may be preferred in individuals with renal failure and in individuals allergic to intravenous CT contrast.
  - Both contrast CT and MRI are considered to have the same risk profile with renal failure (GFR <30mL/min).
  - Prior to 2006, type 1 Gadolinium contrast agents were used in individuals with renal failure and associated diminished GFR. A condition known as nephrogenic systemic fibrosis (NSF), a scleroderma-like diseased, was reported in a small percentage of these individuals and thought to be due to toxic effects of free Gadolinium on the soft tissues. Since that time, newer macrocyclic, Type II contrast agents with a lower rate of Gadolinium dissociation from the carrier molecule have been utilized with very few cases of NSF reported. Utilization of these agents appears to be safe for individuals with diminished renal function.

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  - Multiple studies have demonstrated potential for gadolinium deposition following the use of gadolinium-based contrast agents (GBCAs) for MRI studies. The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting GBCAs use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
- A CT is considered medically necessary in place of an MRI when clinical criteria are met for MRI AND there is a contraindication to having an MRI (e.g., pacemaker, ICD, insulin pump, neurostimulator, etc.).
  - When replacing MRI with CT, contrast level matching should occur as follows:
    - MRI without contrast → CT without contrast
    - MRI without and with contrast → CT with contrast or CT without and with contrast
- The following situations may impact the appropriateness for MRI and/or MR contrast:
  - Caution should be taken in the use of gadolinium in individuals with renal failure.
  - The use of gadolinium contrast agents during pregnancy should be limited to situations in which the benefits clearly outweigh the possible risks.
  - MRI can be performed for non-ferromagnetic body metals (i.e., titanium), although some imaging facilities will consider it contraindicated if recent surgery, regardless of the metal type.
- MRI should not be used as a replacement for CT for the sole reason of avoidance of ionizing radiation when MRI is not considered medically necessary in the condition-based guidelines, since it does not solve the problem of overutilization.
- MRI is superior to other imaging modalities in certain conditions including, but not limited to, the following:
  - Imaging the brain and spinal cord
  - Characterizing visceral and musculoskeletal soft tissue masses
  - Evaluating musculoskeletal soft tissues including ligaments and tendons
  - Evaluating inconclusive findings on ultrasound or CT
  - Individuals who are pregnant or have high radiation sensitivity
  - Suspicion, diagnosis, or surveillance of infections
- More specific guidance for MRI usage, including exceptions to this general guidance, can be found throughout the condition-specific guidelines.

Positron Emission Tomography (PET) Criteria

- PET is a nuclear medicine study that uses a positron emitting radiotracer to create cross-sectional and volumetric images based on tissue metabolism.

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- Conventional imaging (frequently CT, sometimes MRI or bone scan) of the affected area(s) drives much of initial and restaging and surveillance imaging for malignancy and other chronic conditions. PET is not considered medically necessary for surveillance imaging unless specifically stated in the condition-specific guideline sections.
- PET/MRI is generally not considered medically necessary, see **PET-MRI (Preface-5.3)**.
- PET is rarely performed as a single modality, but is typically performed as a combined PET/CT.
  - The unbundling of PET/CT into separate PET and diagnostic CT CPT® codes is not considered medically necessary, because PET/CT is done as a single study.
- PET/CT lacks the tissue definition of CT or MRI but is fairly specific for metabolic activity based on the radiotracer used.
- Indications for PET/CT may include the following:
  - Oncologic Imaging for evaluation of tumor metabolic activity
  - Cardiac Imaging for evaluation of myocardial metabolic activity
  - Brain Imaging for evaluation of metabolic activity for procedural planning
- More specific guidance for PET usage, including exceptions to this general guidance, can be found throughout the condition-specific guidelines.

Imaging Criteria in Pregnancy and Lactation

- Necessary diagnostic imaging should not be withheld from a pregnant individual when the clinical benefit is expected to outweigh the theoretical risk to the fetus.
- Pregnancy alone is not a clinical indication to change the recommended imaging modality when the guideline-supported study is the most effective test for the diagnosis in question.
- Ultrasonography and MRI (without gadolinium contrast) are not associated with known risk to the fetus and are the preferred imaging techniques for the pregnant individual when they are diagnostically equivalent to other modalities for the clinical question.
- With few exceptions, radiation exposure through radiography, CT, or nuclear medicine imaging techniques is at a dose much lower than the exposure associated with fetal harm. Fetal risk of anomalies, growth restriction, or abortion has not been reported with radiation exposure of less than 50mGy, a level above the range of exposure for most diagnostic procedures.
- X-ray with appropriate shielding is acceptable during pregnancy. Common examinations such as extremity, chest, and cervical spine radiography result in very low fetal doses (<0.1mGy).
- CT and associated contrast material should not be withheld if clinically indicated. If accessible in a timely manner, MRI should be considered as an alternative to CT during pregnancy in cases in which the two modalities are diagnostically equivalent.

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- The use of gadolinium-based contrast agents during pregnancy should be limited to situations in which the benefits clearly outweigh the possible risks. Gadolinium may be used in a pregnant individual only if it significantly improves diagnostic performance and is expected to improve fetal or maternal outcome.
- Iodinated contrast should be used in pregnancy only if required to obtain additional diagnostic information that will affect the care of the fetus or the pregnant individual during the pregnancy.
- Radioactive iodine (I-131) should not be used during pregnancy. If a diagnostic thyroid scan is essential, technetium-99m is the isotope of choice.
- Breastfeeding should not be interrupted after gadolinium or iodinated contrast administration.
- There is no risk to lactation from external sources of ionizing radiation (diagnostic x-rays).
- More specific guidance for imaging in pregnancy can be found throughout the condition-specific guidelines.

Overutilization of Advanced Imaging Criteria

- A number of reports describe overutilization in many areas of advanced imaging and other procedures, which may include the following:
  - High-level testing without consideration of less invasive, lower cost options which may adequately address the clinical question at hand
  - Excessive radiation and costs with unnecessary testing
  - Defensive medical practice
  - CT without and with contrast (so called “double contrast studies") requests, which have few current indications
  - MRI requested in place of CT to avoid radiation without considering the primary indication for imaging
  - Adult CT settings and protocols used for smaller people and children
  - Unnecessary imaging procedures when the same or similar studies have already been conducted
- A review of the imaging or other relevant procedural histories of all individuals presenting for studies has been recognized as one of the more important processes that can be significantly improved. By recognizing that a duplicate or questionably considered medically necessary imaging study has been ordered for individuals, it may be possible to avoid exposing them to unnecessary risks. To avoid these unnecessary risks, the precautions below should be considered:
  - The results of initial diagnostic tests or radiologic studies to narrow the differential diagnosis should be obtained prior to performing further tests or radiologic studies.
  - The clinical history should include a potential indication such as a known or suspected abnormality involving the body part for which the imaging study is being

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requested. These potential indications are addressed in greater detail within the applicable guidelines.
    - The results of the requested imaging procedures should be expected to have an impact on individual management or treatment decisions.
    - Repeat imaging studies are not considered medically necessary unless there is evidence of disease progression, recurrence of disease, and/or the repeat imaging will affect an individual's clinical management.
- Pre-operative imaging/pre-surgical planning imaging/pre-procedure imaging is not considered medically necessary if the surgery/procedure is not considered medically necessary. Once the procedure has been approved or if the procedure does not require prior authorization, the appropriate pre-procedural imaging may be approved.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Coding Issues (Preface-4)

Guideline

3D Rendering (Preface-4.1)
Unlisted Procedures/Therapy Treatment Planning (Preface-4.3)
Unilateral Versus Bilateral Breast MRI (Preface-4.4)
CPT® 76380 Limited or Follow-up CT (Preface-4.5)
SPECT/CT Imaging (Preface-4.6)
CPT® 76140 Interpretation of an Outside Study (Preface-4.7)
Quantitative MR Analysis (Preface-4.8)
HCPCS Codes (Preface-4.9)
References (Preface-4)

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3D Rendering (Preface-4.1)

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CPT® 76376 and CPT® 76377 Criteria

- Both codes require concurrent supervision of the image post-processing 3D manipulation of the volumetric data set and image rendering.
  - Concurrent supervision is defined as active physician participation in and monitoring of the reconstruction process including design of the anatomic region that is to be reconstructed; determination of the tissue types and actual structures to be displayed (e.g., bone, organs, and vessels); determination of the images or cine loops that are to be archived; and monitoring and adjustment of the 3D work product. The American College of Radiology (ACR) recommends that it is best to document the physician's supervision or participation in the 3D reconstruction of images.
- These two codes differ in the need for and use of an independent workstation for post-processing.
  - CPT® 76376 reports procedures not requiring image post-processing on an independent workstation.
  - CPT® 76377 reports procedures that require image post-processing on an independent workstation.
- These 3D rendering codes should not be used for 2D reformatting.
- Two-dimensional reconstruction (e.g., reformatting an axial scan into the coronal plane) is now included in all cross-sectional imaging base codes and is not separately reimbursable.
- The codes used to report 3D rendering for ultrasound and echocardiography are also used to report the 3D post processing work on CT, MRI, and other tomographic modalities.
- Providers may be required to obtain prior authorization on these 3D codes even if prior authorization is not required for the echocardiography and/or ultrasound procedure codes. It may appear that EviCore pre-authorizes echocardiography and/or ultrasound when, in fact, it may only be the 3D code that needs the prior authorization.
- CPT® codes for 3D rendering should not be billed in conjunction with computer-aided detection (CAD), MRA, CTA, nuclear medicine SPECT studies, PET, PET/CT, stereotactic localization (CPT® 77011 or CPT® 70486 if used), Mammogram, MRI Breast, US Breast, CT Colonography (virtual colonoscopy), Cardiac MRI, Cardiac CT, or Coronary CTA studies.

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- CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) can be considered in the following clinical scenarios:
  - Bony conditions:
    - Evaluation of congenital skull abnormalities in newborns, infants, and toddlers (usually for pre-operative planning)
    - Complex fractures (comminuted or displaced)/dislocations of any joint (for pre-operative planning when conventional imaging is insufficient)
    - Spine fractures, pelvic/acetabulum fractures, intra-articular fractures (for pre-operative planning when conventional imaging is insufficient)
    - Pre-operative planning for other complex surgical cases
    - Complex facial fractures
  - Pre-operative planning for other complex surgical cases
  - Cerebral angiography
  - Pelvis conditions:
    - Uterine intra-cavitary lesion when initial US is equivocal: See **Abnormal Uterine Bleeding (AUB) (PV-2.1)** and **Leiomyoma/Uterine Fibroids (PV-12.1)** in the Pelvis Imaging Guidelines.
    - Hydrosalpinxes or peritoneal cysts when initial US is indeterminate: See **Complex Adnexal Masses (PV-5.3)** in the Pelvis Imaging Guidelines.
    - Lost IUD (inability to feel or see IUD string) with initial US: See **Intrauterine Device (PV-10.1)** in the Pelvis Imaging Guidelines.
    - Uterine anomalies with initial US: See **Uterine Anomalies (PV-14.1)** in the Pelvis Imaging Guidelines.
    - Infertility: See **Initial Infertility Evaluation, Female (PV-9.1)** in the Pelvis Imaging Guidelines.
    - For further delineation of the junctional zone in suspected adenomyosis: See **General Guidelines - Overview (PV-1.1)** in the Pelvis Imaging Guidelines.
  - Abdomen conditions:
    - CT Urogram: See **Hematuria and Hydronephrosis (AB-39)** in the Abdomen Imaging Guidelines.
    - MRCP: See **MR Cholangiopancreatography (MRCP) (AB-27)** in the Abdomen Imaging Guidelines.
- For indications for 3D rendering for oncology, refer to the guideline sections below in the Oncology Imaging Guidelines.
  - Pancreatic cancer: See **Pancreatic Cancer - Screening Studies for Pancreatic Cancer (ONC-13.1)**, **Pancreatic Cancer - Suspected/Diagnosis (ONC-13.2)**, **Pancreatic Cancer - Initial Work-up/Staging (ONC-13.3)**, **and Pancreatic Cancer - Restaging/Recurrence (ONC-13.4)**

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- Gallbladder and biliary tumors: See **Gallbladder and Biliary Tumors - Initial Work-up/Staging (ONC-14.6)**
- Prostate cancer: See **Prostate Cancer - General Considerations (ONC-19.0)**, **Suspected Prostate Cancer (ONC-19.1)**, and **Prostate Cancer - Follow-up on Active Surveillance (ONC-19.4)**
- Liver metastases: See **Liver Metastases and Liver-Directed Therapies (ONC-31.2)**

HCPCS C8001 Criteria

- HCPCS C8001 is to be used for 3D anatomical segmentation imaging for preoperative planning, data preparation, and transmission, obtained from previous diagnostic computed tomographic or magnetic resonance examination of the same anatomy.

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Unlisted Procedures/Therapy Treatment Planning (Preface-4.3)

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Unlisted Procedures Criteria

CPT®	Description
78999	Unlisted procedure, diagnostic nuclear medicine
76498	Unlisted MR procedure (e.g., diagnostic or interventional)
76497	Unlisted CT procedure (e.g., diagnostic or interventional)

- For general information related to unlisted procedures, please refer to **Management of Unlisted Codes**.
- These unlisted codes should be reported whenever a diagnostic or interventional CT or MR study is performed in which an appropriate anatomic site-specific code is not available.
  - A Category III code that describes the procedure performed must be reported rather than an unlisted code if one is available.
- CPT® 76497 or CPT® 76498 (Unlisted CT or MRI procedure) is considered medically necessary in the following clinical scenarios:
  - Studies done for navigation and planning for neurosurgical procedures (i.e. Stealth or Brain Lab Imaging)
  - Custom joint arthroplasty planning (not as an alternative recommendation): See **Osteoarthritis (MS-12.1)** in the Musculoskeletal Imaging Guidelines.
  - Any procedure/surgical planning if thinner cuts or different positional acquisition (than those on the completed diagnostic study) are needed. These could include navigational bronchoscopy. See **Navigational Bronchoscopy (CH-1.7)** in the Chest Imaging Guidelines.

Therapy Treatment Planning

- Radiation Therapy Treatment Planning: See **Unlisted Procedure Codes in Oncology (ONC-1.5)** in the Oncology Imaging Guidelines.

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Unilateral Versus Bilateral Breast MRI (Preface-4.4)

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Criteria

- Diagnostic MRI of both breasts should be coded as CPT® 77049 regardless of whether both breasts are imaged simultaneously or whether unilateral breast MRI is performed in two separate imaging sessions.

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CPT® 76380 Limited or Follow-up CT (Preface-4.5)

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Criteria

- CPT® 76380 describes a limited or follow-up CT scan. The code is used to report any CT scan, for any given area of the body, in which the work of a full diagnostic code is not performed.
- Common examples include, but are not limited to, the following:
  - Limited sinus CT imaging protocol
  - Limited or follow-up slices through a known pulmonary nodule
  - Limited slices to assess a non-healing fracture (such as the clavicle)
- Limited CT (CPT® 76380) is not considered medically necessary for treatment planning purposes. See **Unlisted Procedure Codes in Oncology (ONC-1.5)** in the Oncology Imaging Guidelines.
- It is inappropriate to report CPT® 76380, in conjunction with other diagnostic CT codes, to cover 'extra slices' in certain imaging protocols.
  - There is no specific number of sequences or slices defined in any CT CPT® code definition.
  - The AMA, in *CPT® 2019*, does not describe nor assign any minimum or maximum number of sequences or slices for any CT study.
    - A few additional slices or sequences are not uncommon.
    - CT imaging protocols are often influenced by the individual's clinical situation. Sometimes the protocols require more time and sometimes less.

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SPECT/CT Imaging (Preface-4.6)

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Criteria

- SPECT/CT involves SPECT (Single Photon Emission Computed Tomography) nuclear medicine imaging and CT for optimizing location, accuracy, and attenuation correction and combines functional and anatomic information.
  - Common studies using this modality include ^{123}I- or ^{131}I-Metaiodobenzylguanidine (MIBG) and octreotide scintigraphy for neuroendocrine tumors.
- Hybrid Nuclear/CT scan can be reported as CPT® 78830 (single area and single day), CPT® 78831 (2 or more days), or CPT® 78832 (2 areas with one day and 2-day study).
- CPT® 78072 became effective January 1, 2013 for SPECT/CT parathyroid nuclear imaging.

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CPT® 76140 Interpretation of an Outside Study (Preface-4.7)

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Criteria

- It is inappropriate to use diagnostic imaging codes for interpretation of a previously performed exam that was completed at another facility.
  - If the outside exam is being used for comparison with a current exam, the diagnostic code for the current examination includes comparison to the prior study.
  - CPT® 76140 is the appropriate code to use for an exam which was completed elsewhere and a secondary interpretation of the images is requested.

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Quantitative MR Analysis (Preface-4.8)

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Criteria

- Category III CPT® codes for quantitative analysis of multiparametric-MR (mp-MRI) data with and without an associated diagnostic MRI have been established. Quantitative mp-MRI uses software to analyze tissue physiology of visceral organs and other anatomic structures non-invasively.
- For criteria associated with these types of studies, please see the condition-specific guidelines.

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HCPCS Codes (Preface-4.9)

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Criteria

- Healthcare Common Procedure Coding System (HCPCS) codes are utilized by some hospitals in favor of the typical Level-III CPT® codes. These codes are typically 4 digits preceded by a C or S.
  - Many of these codes have similar code descriptions to Level-III CPT® codes (i.e., C8931 – MRA with dye, Spinal Canal; and, CPT® 72159 – MRA Spinal Canal).
  - If cases are submitted with HCPCS codes with similar code descriptions to the typical Level-III CPT® codes, those procedures should be managed in the same manner as the typical CPT® codes.
  - HCPCS code management is discussed further in the applicable guideline sections.
- Requests for many Healthcare Common Procedure Coding System (HCPCS) codes, including non-specific codes such as S8042 (Magnetic resonance imaging [MRI], low-field), should be redirected to a more appropriate and specific CPT® code. Exceptions are noted in the applicable guideline sections.

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References (Preface-4)

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Whole-Body Imaging (Preface-5)

Guideline

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Whole Body CT Imaging (Preface-5.1)

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Criteria

- Whole-body CT or LifeScan (CT Brain, Chest, Abdomen, and Pelvis) for screening of asymptomatic individuals is not a covered benefit. The performance of whole-body screening CT examinations in healthy individuals does not meet any of the current validity criteria for screening studies and there is no clear documentation of benefit versus radiation risk.
- Whole-body low-dose skeletal CT is supported for oncologic staging in Multiple Myeloma. See **Multiple Myeloma and Plasmacytomas (ONC-25)** in the Oncology Imaging Guidelines.

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Whole-Body MR Imaging (Preface-5.2)

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Criteria

- Whole-body MRI (WBMRI) is, with the exception of select cancer predisposition syndromes and autoimmune conditions discussed below, generally considered not medically necessary at this time due to lack of standardization in imaging technique and lack of evidence that WBMRI improves outcome for any individual disease state.
  - While WBMRI has the benefit of whole-body imaging and lack of radiation exposure, substantial variation still exists in the number of images, type of sequences (STIR vs. diffusion weighting, for example), and contrast agent(s) used.
- Coding considerations:
  - There are no established CPT® or HCPCS codes for reporting WBMRI.
  - WBMRI is at present only reportable using CPT® 76498. All other methods of reporting whole-body MRI are inappropriate including the following:
    - Separate diagnostic MRI codes for multiple individual body parts
    - MRI Bone Marrow Supply (CPT® 77084)
- Disease-specific considerations:
  - Cancer screening:
    - Interval WBMRI is recommended for cancer screening in individuals with select cancer predisposition syndromes. Otherwise, WBMRI has not been shown to improve outcomes for cancer screening.
      - For additional information, see **Li-Fraumeni Syndrome (LFS) (PEDONC-2.2)**, **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)**, **Rhabdoid Tumor Predisposition Syndrome (PEDONC-2.11)**, **Hereditary Paraganglioma-Pheochromocytoma (HPP) Syndromes (PEDONC-2.13)**, **Constitutional Mismatch Repair Deficiency (CMMRD or Turcot Syndrome) (PEDONC-2.15)**, **Infantile Myofibromatosis (PEDONC-2.18)**, or **Bloom Syndrome (PEDONC-2.19)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
  - Cancer staging and restaging:
    - Whole-body MRI has limited indications in staging and restaging of multiple myeloma. See **Multiple Myeloma and Plasmacytomas (ONC-25)** in the Oncology Imaging Guidelines for additional details.
    - Evidence has not been published establishing WBMRI as a standard evaluation for any other type of cancer.
  - Autoimmune disease:

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- WBMRI can be approved in some situations for individuals with chronic recurrent multifocal osteomyelitis.
  - For additional information, see **Chronic Recurrent Multifocal Osteomyelitis (PEDMS-10.2)** in the Pediatric Musculoskeletal Imaging Guidelines.

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PET/MRI (Preface-5.3)

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Criteria

- PET/MRI is generally considered not medically necessary for a vast majority of oncologic and neurologic conditions due to lack of standardization in imaging technique and interpretation. However, it is considered medically necessary in select circumstances when the following criteria are met:
  - The individual meets condition-specific guidelines for PET/MRI OR
  - The individual meets ALL of the following:
    - The individual meets guideline criteria for PET/CT, **AND**
    - PET/CT is not available at the treating institution, **AND**
    - The provider requests PET/MRI in lieu of PET/CT
- When the above criteria are met, PET/MRI is reported using the code combination of PET Whole-Body (CPT® 78813) and MRI Unlisted (CPT® 76498). All other methods of reporting PET/MRI are inappropriate.
  - When clinically appropriate, diagnostic MRI codes can be considered medically necessary at the same time as the PET/MRI code combination.
- For more information, please see the appropriate condition-based guideline.

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- Complete reference citations for the journal articles are embedded within the body of the guidelines and/or may be found on the Reference pages at the end of some guideline sections.

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Procedure Codes Associated with the Preface to the Imaging Guidelines (Preface)

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Procedure Codes Associated with the Preface to the Imaging Guidelines (Preface)

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Procedure Codes Associated with the Preface to the Imaging Guidelines (Preface)

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The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Description
19085	Biopsy, breast, with placement of breast localization device(s), when performed, and imaging of the biopsy specimen, when performed, percutaneous; first lesion, including MR guidance
19086	Biopsy, breast, with placement of breast localization device(s), when performed, and imaging of the biopsy specimen, when performed, percutaneous; each additional lesion, including MR guidance
20982	Ablation therapy for reduction or eradication of 1 or more bone tumors (eg, metastasis) including adjacent soft tissue when involved by tumor extension, percutaneous, including imaging guidance when performed; radiofrequency
70486	Computed tomography, maxillofacial area; without contrast material
75989	Imaging guidance for percutaneous drainage with placement of catheter (all modalities)
76140	Consultation on X-ray examination made elsewhere, written report
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
76380	Computed tomography, limited or localized follow-up study

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Code	Description
76497	Unlisted computed tomography procedure (eg, diagnostic, interventional)
76498	Unlisted magnetic resonance procedure (eg, diagnostic, interventional)
76942	Ultrasonic guidance for needle placement
77002	Fluoroscopic guidance for needle placement (eg, biopsy, aspiration, injection, localization device) (List separately in addition to code for primary procedure)
77003	Fluoroscopic guidance and localization of needle or catheter tip for spine or paraspinous diagnostic or therapeutic injection procedures (epidural or subarachnoid) (List separately in addition to code for primary procedure)
77011	CT guidance for stereotactic localization
77012	CT guidance for needle placement
77013	CT guidance for, and monitoring of parenchymal tissue ablation
77021	MR guidance for needle placement
77022	MR guidance for, and monitoring of parenchymal tissue ablation
77049	Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; bilateral
78072	Parathyroid planar imaging (including subtraction, when performed); with tomographic (SPECT), and concurrently acquired computed tomography (CT) for anatomical localization
78813	Positron emission tomography (PET) imaging; whole body
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging
78831	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days

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Code	Description
78832	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
78999	Unlisted procedure, diagnostic nuclear medicine
C8001	3D anatomical segmentation imaging for preoperative planning, data preparation and transmission, obtained from previous diagnostic computed tomographic or magnetic resonance examination of the same anatomy

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General Guidelines (AB-1)

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Abbreviations for Abdomen Imaging Guidelines

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Abbreviations for Abdomen Imaging Guidelines	
AAA	abdominal aortic aneurysm
AASLD	American Association for the Study of Liver Diseases
ACE	angiotensin-converting enzyme
ACG	American College of Gastroenterology
ACR	American College of Radiology
ACTH	adrenocorticotropic hormone
AFP	alpha-fetoprotein
AGA	American Gastroenterological Association
ALKP	alkaline phosphatase
ALT	alanine aminotransferase
ASGE	American Society for Gastrointestinal Endoscopy
AST	aspartate aminotransferase
AUA	American Urological Association
BEIR	Biological Effects of Ionizing Radiation
BMP	basic metabolic panel
BUN	blood urea nitrogen

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Abbreviations for Abdomen Imaging Guidelines	
CAG	Canadian Association of Gastroenterology
CBC	complete blood count
CMP	comprehensive metabolic panel
CNS	central nervous system
CT	computed tomography
CTA	computed tomography angiography
CTC	computed tomography colonography (aka: virtual colonoscopy)
DVT	deep vein thrombosis
ERCP	endoscopic retrograde cholangiopancreatography
ESR	erythrocyte sedimentation rate
EUS	endoscopic ultrasound
FNH	focal nodular hyperplasia
GFR	glomerular filtration rate
GGT	gamma glutamyl transferase
GI	gastrointestinal
HCC	hepatocellular carcinoma
HCPCS	Healthcare Common Procedural Coding System (commonly pronounced: “hix pix”)
HU	Hounsfield units
IAA	iliac artery aneurysm
IV	intravenous

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Abbreviations for Abdomen Imaging Guidelines	
KUB	kidneys, ureters, bladder (plain frontal supine abdominal radiograph)
LFT	liver function tests
MASLD	metabolic dysfunction associated steatotic liver disease (formerly known as NAFLD)
MRCP	magnetic resonance cholangiopancreatography
MRA	magnetic resonance angiography
MRE	magnetic resonance elastography
MRI	magnetic resonance imaging
mSv	millisievert
NAFLD	nonalcoholic fatty liver disease (now known as MASLD)
PA	posteroanterior projection
PET	positron emission tomography
RAS	renal artery stenosis
RBC	red blood cell
SBFT	small bowel follow through
SPECT	single photon emission computed tomography
VC	virtual colonoscopy (CT colonography)
PFT	pulmonary function tests
WBC	white blood cell
ZES	Zollinger-Ellison Syndrome

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General Guidelines (AB-1.0)

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Criteria

- A pertinent clinical evaluation since the new onset or change in symptoms is required prior to advanced imaging:
  - A pertinent clinical evaluation should include the following:
    - A detailed history and physical examination relevant to the current complaint, including a thorough abdominal examination with assessment for the presence, location, and characteristics of any abdominal mass, wall defect, or hernia
    - Appropriate laboratory studies
    - Non-advanced imaging modalities such as plain x-ray or ultrasound of the area of concern
  - For an established individual, a meaningful technological contact (telehealth visit, telephone call, electronic mail, or messaging) since the onset of change in symptoms can serve as a pertinent clinical evaluation.
- Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crest.
- Pelvic imaging begins at the iliac crest and extends to the pubis.
  - The uterus, fallopian tubes and ovaries arise out of the pelvis and are considered pelvic organs. If the uterus or adnexa rise out of the pelvic cavity, above the level of the iliac crest or umbilicus on physical exam or previous imaging, abdominal imaging may be added for the completion of imaging.
- Imaging for clinical concerns at the dividing line can be providers' choice (abdomen and pelvis; abdomen or pelvis).

Red Flag Findings

- The presence of any red flag finding in an individual with abdominal pain indicates possible serious underlying pathology. In these cases, prerequisite testing (e.g., ultrasound and/or laboratory studies) is not required. Requests for appropriate advanced imaging (e.g., CT or MRI) may be approved without prior testing, consistent with the applicable condition-specific guideline.
- Red flag findings include ANY of the following:
  - History of malignancy with documented risk of abdominal or intra-abdominal metastasis
  - Immunocompromised individual (e.g., on immunosuppressive therapy, history of human immunodeficiency virus [HIV])

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- Fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher)
- Elevated white blood cell count (WBC) greater than 10,000 cells/mm³, or above the upper limit of normal for the particular lab reporting the result
- Low WBC (absolute neutrophil count less than 1,000 cells/mm³)
- Palpable abdominal mass of clinical concern
- Gastrointestinal (GI) bleeding, overt or occult, not obviously hemorrhoidal
- Abdominal tenderness documented as moderate or severe
- Peritoneal signs, such as guarding or rebound tenderness
- Suspected complication of bariatric surgery
- Notation by the ordering provider that the individual has a "surgical abdomen"
- Age 60 years or older with unintentional weight loss of 10 pounds or more, or 5% or more of body weight, over 6 months or less, without an identifiable reason

Pregnancy Considerations for Imaging

- In pregnant individuals evaluation with ultrasound or MRI without contrast to avoid radiation exposure is considered medically necessary.
- If these modalities are nondiagnostic or insufficient, CT or other imaging involving ionizing radiation may be performed when necessary to establish the diagnosis and guide management.

Imaging Recommended Per Drug Manufacturer

- When follow-up imaging for the purposes of monitoring or screening is recommended in the package insert for a particular drug therapy or medication, that imaging may be considered medically necessary.

Complications Related to COVID-19

- Please refer to the appropriate condition-specific guideline relevant to the presenting signs or symptoms in individuals with potential sequelae of COVID-19.

Pre-operative Radiologic Imaging

- If imaging is requested by the operating surgeon to support planned surgery, the imaging is considered medically necessary.
- Please refer to the appropriate condition-specific guideline relevant to the clinical condition for pre-operative imaging indications.

3D Rendering

- CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) is considered medically necessary in the following clinical scenarios:

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  - Pre-operative planning for complex surgical cases
  - CT Urogram (See: **Hematuria and Hydronephrosis (AB-39)**)
  - MRCP (See: **MR Cholangiopancreatography (MRCP) (AB-27)**)
- CPT® codes for 3D rendering should not be billed in conjunction with computer-aided detection (CAD), MRA, CTA, nuclear medicine SPECT studies, PET, PET/CT, or CT Colonography (virtual colonoscopy).

Background and Supporting Information

The American College of Obstetricians and Gynecologists (ACOG) provides guidance on imaging during pregnancy and lactation. Ultrasonography and magnetic resonance imaging (MRI), which do not involve ionizing radiation, are the preferred imaging modalities in pregnant individuals. These modalities should be used when the results are expected to address a clinically relevant question or provide medical benefit (ACOG, 2017; Faerber et al., 2020).

When ultrasound or MRI cannot adequately answer the clinical question, imaging studies that involve ionizing radiation, such as radiography, computed tomography (CT), and nuclear medicine procedures, should not be withheld if they are necessary for timely diagnosis and management. In most cases, fetal radiation exposure from these modalities is well below thresholds associated with fetal harm, and the potential benefits of accurate diagnosis generally outweigh the theoretical risks of radiation exposure (ACR, 2023).

The use of gadolinium-based contrast with MRI should be limited and reserved for situations in which it significantly improves diagnostic performance and is expected to improve maternal or fetal outcomes. Similarly, iodinated intravenous contrast should only be used when necessary to obtain diagnostic information that will impact clinical management (ACR, 2024; Pedrosa et al., 2025).

Evidence Discussion

Evidence supported a tiered approach to abdominal imaging in which ultrasound is frequently used as the initial modality in appropriately selected clinical scenarios. Literature and guideline-based data demonstrated that ultrasound provided adequate diagnostic performance for hepatobiliary and superficial pathology while avoiding ionizing radiation (American College of Radiology [ACR], 2023; Dietrich et al., 2020). In addition to its safety profile, ultrasound allows real-time assessment and serves as an effective triage tool to determine whether further imaging is required and to guide modality selection, including the use of computed tomography (CT) or magnetic resonance imaging (MRI) without or with contrast (ACR, 2023, 2024). However, its diagnostic performance is reduced for deep structures, bowel pathology, and lesions obscured by overlying gas (ACR, 2023; Dietrich et al., 2020).

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Gastroenterology consultation may also be valuable in guiding imaging selection when the differential diagnosis includes mesenteric or colonic ischemia, chronic diarrhea or constipation, irritable bowel syndrome (IBS), obscure gastrointestinal bleeding, or pancreaticobiliary disease requiring consideration of magnetic resonance cholangiopancreatography (MRCP). Specialist evaluation can help refine pretest probability, determine the need for endoscopic or laboratory evaluation, and identify scenarios in which advanced imaging is clinically indicated (ACR, 2023, 2024).

Certain populations and clinical presentations warrant modification of a routine ultrasound-first strategy. In pediatric individuals and pregnant individuals, ultrasonography remains the preferred initial imaging modality because it avoids ionizing radiation while providing diagnostic information for a broad range of abdominal conditions. However, MRI may be required when ultrasound findings are nondiagnostic or when evaluation of deeper abdominal structures is necessary. This consideration is particularly relevant during the third trimester of pregnancy, when physiologic and anatomic changes may further limit ultrasound visualization (ACOG, 2017; ACR, 2023, 2024). Additionally, the absence of severe pain does not exclude significant intra-abdominal pathology. Individuals presenting with a painless acute abdomen or atypical symptoms, particularly older adults and immunocompromised populations, may still require prompt cross-sectional imaging when clinical suspicion for serious pathology remains high (ACR, 2023).

Deviation from this stepwise approach is warranted in the presence of clinical features that elevate pretest probability for serious or time-sensitive pathology. In these contexts, immediate cross-sectional imaging improves diagnostic yield and reduces delays in care (ACR, 2023).

- **Risk of metastases**: Advanced imaging is considered medically necessary when clinical suspicion for disseminated malignancy is high. CT and MRI provide superior detection of metastatic disease in the liver, lungs, and lymphatic structures, which are common sites of spread across multiple primary tumors. Ultrasound has reduced sensitivity for intraluminal and hollow viscus involvement due to acoustic limitations in gas-filled structures. Cross-sectional imaging allows comprehensive staging, which directly informs treatment pathways and prognostic assessment (ACR, 2023; National Institute for Health and Care Excellence [NICE], 2023). This is particularly relevant when systemic symptoms or known primary malignancy increase pretest probability of metastatic disease.
- **Fever**: Fever in combination with abdominal pain, gastrointestinal bleeding, vomiting, or unexplained weight loss signals possible intra-abdominal infection, ischemia, or inflammatory disease. CT is well suited for detecting complications such as perforation, abscess formation, and bowel ischemia due to its spatial resolution and ability to assess both bowel wall and mesenteric structures (ACR, 2023; ACR et al., 2021). MRI offers comparable soft tissue characterization without radiation, particularly in individuals requiring repeat imaging (ACR, 2023). Early cross-sectional

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imaging reduces diagnostic uncertainty in conditions where progression to sepsis or perforation is possible (Sandherr et al., 2025).

- **Abnormal white blood cell count**: Leukocytosis or neutropenia modifies both risk stratification and urgency of imaging. In neutropenic individuals, clinical examination is often unreliable, and conditions such as neutropenic enterocolitis may progress rapidly with subtle initial findings. CT imaging allows early detection of bowel wall thickening, pneumatosis, or complications that would not be reliably visualized on ultrasound. Timely identification is critical given the high morbidity associated with delayed treatment in immunocompromised populations (Nematolahi et al., 2025; Sandherr et al., 2025). In leukocytosis, cross-sectional imaging similarly refines diagnosis across a spectrum of infectious and inflammatory conditions.
- **Concerning palpable mass**: Evaluation of a palpable mass requires modality selection based on suspected anatomic origin. Ultrasound is appropriate for initial characterization of superficial or cystic lesions, but CT or MRI is considered medically necessary when malignancy is suspected, when lesions are deep, or when local invasion must be assessed. Cross-sectional imaging provides superior delineation of tissue planes, vascular involvement, and regional spread, all of which are necessary for staging and management planning (ACR, 2023; NICE, 2023). When pain accompanies a mass, the likelihood of complications such as necrosis or obstruction increases, further supporting advanced imaging.
- **GI bleeding**: When endoscopic evaluation is nondiagnostic or contraindicated, CT angiography offers high diagnostic performance and facilitates localization of active bleeding. Its sensitivity and specificity, reported near 86% and 95% respectively, support its role in acute settings where rapid identification guides embolization or surgical intervention (Sengupta et al., 2023). Imaging selection should also account for hemodynamic stability and institutional expertise, as unstable individuals may require immediate intervention rather than staged diagnostics.
- **Significant abdominal tenderness, with or without peritoneal signs**: Severe or rapidly progressive abdominal pain raises concern for surgical pathology such as perforation, ischemia, or obstruction. CT is the preferred modality due to its ability to evaluate bowel integrity, detect free air, and assess mesenteric perfusion. Ultrasound lacks sufficient sensitivity in these contexts, particularly in individuals with guarding, obesity, or extensive bowel gas. This limitation is more pronounced in populations with atypical presentations, including older adults and immunocompromised individuals, where delayed diagnosis carries significant risk (ACR, 2023).
- **Post-bariatric surgery complications**: Individuals with altered anatomy after procedures such as Roux-en-Y gastric bypass are at elevated risk for internal hernia, obstruction, or marginal ulceration. These conditions often present with nonspecific symptoms and require early CT imaging for diagnosis. Cross-sectional imaging allows visualization of mesenteric swirl, bowel obstruction patterns, and ischemic changes, which are not reliably detected by ultrasound. Prompt identification reduces risk of bowel necrosis and associated morbidity (Fry & Finks, 2023).

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- **Unintentional weight loss**: Clinically significant weight loss, classically defined as at least 5% of body weight within one month or 10% over six months, is associated with increased mortality and warrants systematic evaluation. Imaging plays an important role when the initial history, physical examination, and laboratory assessment do not identify an etiology. Cross-sectional imaging is often preferred because it can detect occult malignancy, chronic infection, and structural gastrointestinal disease that may not be apparent through routine evaluation. Diagnostic imaging should be guided by clinical findings, risk factors, and the results of the initial assessment, particularly in older adults and individuals with additional features concerning for serious underlying disease (Rao et al., 2026; NICE, 2023).

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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CT Imaging (AB-1.2)

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Criteria

- CT imaging is a more generalized modality. CT Abdomen is usually performed with contrast (CPT® 74160):
  - Oral contrast has no relation to the IV contrast administered. Coding for contrast only refers to IV contrast. There is no coding for oral contrast.
  - Exceptions are noted in these guidelines and include:
    - CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170) with suspicion of a solid organ lesion (liver, kidney, pancreas, spleen)
      - Please refer to the specific guideline for the lesion in question for specific guidance.
    - CT Abdomen without contrast (CPT® 74150) or CT Abdomen and Pelvis without contrast (CPT® 74176) if there is renal insufficiency/failure, or a documented allergy to contrast. It can also be considered medically necessary for diabetics or the very elderly.
    - CT Abdomen and Pelvis without and with contrast (CPT® 74178 – CT Urogram) for certain urologic conditions (e.g., hematuria).
  - Shellfish allergy:
    - It is commonly assumed that an allergy to shellfish infers iodine allergy, and that this implies an allergy to CT iodinated contrast media. However, this is NOT true. Shellfish allergy is due to tropomysins. Iodine plays no role in these allergic reactions. Allergies to shellfish do not increase the risk of reaction to IV contrast any more than that of other allergens.
  - CT Abdomen and Pelvis, usually with contrast (CPT® 74177), is considered medically necessary when signs or symptoms are generalized, or involve a lower quadrant of the abdomen.
  - CT Enterography (CPT® 74177) combines CT imaging with large volumes of ingested neutral bowel contrast material to allow visualization of the small bowel.
  - CT Enteroclysis
    - A tube is placed through the nose or mouth and advanced into the duodenum or jejunum. Bowel contrast material is infused through the tube and CT imaging is performed either with or without intravenous contrast.
    - CT Enteroclysis is used to allow visualization of the small bowel wall and lumen. CT Enteroclysis may allow better or more consistent distention of the small bowel than CT Enterography.

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        - Report by assigning: CPT® 74176 or CPT® 74177
    - Triple-phase CT
        - 3 phases of a triple-phase CT are:
            - 1) Hepatic arterial phase,
            - 2) Portal venous phase, and
            - 3) Washout or delayed acquisitions phase.
        - It should be noted that, in general, a pre-contrast or non-contrast CT is usually not needed in a standard triple-phase CT, except in those individuals previously treated with locoregional embolic or ablative therapies. Other specific instances in which a prior non-contrast CT is medically necessary for the evaluation of liver lesions are noted in **Liver Lesion Characterization (AB-29.1)**.
- CT Colonography (CTC)
    - There are 3 CPT® codes for CTC:
        - CPT® 74263: Screening CTC (only used for screening procedures)
        - CPT® 74261: CTC without contrast
        - CPT® 74262: CTC with contrast
    - See: **CT Colonography (CTC) (AB-25)** for further indications for these procedures

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MR Imaging (AB-1.3)

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Criteria

- MRI may be preferred as a more targeted study in cases of renal failure, in individuals allergic to intravenous CT contrast, and as noted in these guidelines.
  - MRI Abdomen with contrast only is essentially never performed. If contrast is indicated, MRI Abdomen without and with contrast (CPT® 74183) should be considered medically necessary.
  - For pregnant individuals ultrasound or MRI without contrast should be used to avoid radiation exposure. The use of gadolinium contrast agents is limited during pregnancy, as gadolinium contrast agents cross the placenta and enter the amniotic fluid with unknown long-term effects on the fetus.
    - See: **General Guidelines (AB-1.0): Pregnancy Considerations for Imaging** for additional discussion of this issue
- MR Elastography (CPT® 76391) replaces MRI Abdomen (CPT® 74183 or CPT® 74181) for requests for MR Elastography liver (See: **Liver Elastography (AB-45)**)

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MR Enterography and Enteroclysis Coding Notes (AB-1.4)

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Criteria

- MR Enterography or Enteroclysis is reported in one of two ways:
  - MRI Abdomen without and with contrast (CPT® 74183), or
  - MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

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Ultrasound (AB-1.5)

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Criteria

- Ultrasound, also called sonography, uses high frequency sounds waves to image body structures.
  - The routine use of 3D and 4D rendering (post-processing) in conjunction with ultrasound is considered not medically necessary.
  - All ultrasound studies require permanently recorded images either stored on film or in a Picture Archiving and Communication System (PACS).
  - The use of a hand-held or any Doppler device that does not create a hard-copy output is considered part of the physical examination and is not separately billable. This exclusion includes devices that produce a record that does not permit analysis of bi-directional vascular flow.
- Duplex scan describes an ultrasonic scanning procedure for characterizing the pattern and direction of blood flow in arteries and veins with the production of real-time images integrating B-mode 2D vascular structures, Doppler spectral analysis, and color flow Doppler imaging.
  - The minimal use of color Doppler alone, when performed for anatomical structure identification during a standard ultrasound procedure, is not separately reimbursable.

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Abdominal Ultrasound (AB-1.6)

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Criteria

- Complete abdominal ultrasound (CPT® 76700) includes all of the following required elements:
  - Liver, gallbladder, common bile duct, pancreas, spleen, kidneys, upper abdominal aorta, and inferior vena cava
  - If a particular structure or organ cannot be visualized, the report should document the reason.
- Limited abdominal ultrasound (CPT® 76705) is without all of these required elements and can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
  - Further, CPT® 76705 should:
    - Be assigned to report follow-up studies once a complete abdominal ultrasound (CPT® 76700) has been performed; and
    - Be assigned to report ultrasonic evaluation of diaphragmatic motion; and
    - Be reported only once per individual imaging session; and
      - Not be reported with CPT® 76700 for the same individual for the same imaging session

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Retroperitoneal Ultrasound (AB-1.7)

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Criteria

- Complete retroperitoneal ultrasound (CPT® 76770) includes all of the following required elements:
  - Kidneys, lymph nodes, abdominal aorta, common iliac artery origins, inferior vena cava
  - For urinary tract indications, a complete study can consist of kidneys and bladder
- Limited retroperitoneal ultrasound (CPT® 76775) studies are without all of these required elements and can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
  - Further, CPT® 76775 should:
    - Be assigned to report follow-up studies once a complete retroperitoneal ultrasound (CPT® 76770) has been performed; and
    - Be reported only once per individual imaging session; and
      - Not be reported with CPT® 76770 for the same individual for the same imaging session

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Contrast-Enhanced Ultrasound (AB-1.9)

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Criteria

Ultrasound with contrast (CEUS, CPT® 76978, CPT® 76979) is an emerging technology that may be as good, if not better, than CT or MRI in certain circumstances. Abdominal Imaging Guidelines address its use as appropriate. CPT® 76978 refers to the initial imaging of the first lesion, and CPT® 76979 refers to additional lesions that are imaged subsequently.

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Quantitative MRI (AB-1.10)

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Criteria

- Quantitative MRI analysis of tissue composition (CPT® 0648T, 0649T, 0697T and 0698T)
  - These CPT codes are experimental and investigational.
  - See: **Quantitative MR Analysis of Tissue Composition (Preface-4.8)** and **Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), Formerly Known as NAFLD) (AB-29.2)** for further discussion of these modalities.

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RADCAT Grading System (AB-1.11)

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- The RADCAT (Radiology Report Categorization) Grading System was developed in order to communicate to ordering physicians (most commonly in the ER setting) the relative urgency of a radiologic finding. It is not related to the LI-RADs reporting system, nor does it necessarily imply the need for follow-up imaging, as opposed to clinical follow-up. The rating system is as follows:
  - RADCAT 1: Normal Result
  - RADCAT 2: Routine Result
  - RADCAT 3: Result with recommendation for non-urgent routine follow-up
  - RADCAT 4: Priority Result
  - RADCAT 5: Critical Result

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Abdominal Pain (AB-2)

Guideline

Abdominal Pain (AB-2.2)
Right Upper Quadrant and Epigastric Pain (AB-2.3)
References (AB-2)

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Abdominal Pain (AB-2.2)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- For pregnant individuals, see **General Guidelines (AB-1.0): Pregnancy Considerations for Imaging**
  - Abdominal and/or Pelvic and/or Transvaginal ultrasound (CPT® 76700 and/or CPT® 76856 and/or CPT® 76830) is considered medically necessary initially to avoid ionizing radiation.
  - MRI Abdomen and/or MRI Pelvis without contrast (CPT® 74181 and/or CPT® 72195) is considered medically necessary if the initial US is considered non-diagnostic.
- For the evaluation of left lower abdominal pain (including suspected diverticulitis), right lower abdominal pain (including suspected appendicitis), left upper abdominal pain, mid-abdominal pain, or non-specific abdominal pain of any duration:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if ANY of the following are present:
    - Individuals aged 65 years or older
    - Prior Abdominal and/or Pelvic US appropriate to the anatomic area of concern have been performed and either demonstrated a need for additional imaging OR did not explain the source of pain
    - Recent laboratory studies relevant to the current episode have been performed and are non-diagnostic OR do not point to a specific etiology
      - Laboratory evaluation may include: complete blood count (CBC) with differential, comprehensive metabolic panel (CMP) or basic metabolic panel (BMP), chemistry profile including electrolytes, glucose, creatinine, blood urea nitrogen (BUN) with liver chemistries, erythrocyte sedimentation rate (ESR), amylase and lipase, C-reactive protein (CRP), inflammatory markers, pregnancy testing for reproductive age individuals, and urinalysis (dipstick and/or microscopy depending on the clinical context).
        - Not all listed studies are required; rather, a clinically appropriate subset should be obtained to guide differential diagnosis and determine whether advanced imaging is warranted.
- For follow-up imaging of diverticulitis:

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- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for ANY of the following:
  - acute diverticulitis if symptoms or elevated WBC (greater than 10,000 cells/mm³, or above the upper limit of normal for the particular lab reporting the result) persist despite treatment
  - diverticulitis treated with radiologic intervention (e.g., drainage procedure)
  - complicated diverticulitis, including confirmed abscess, fistulae, free fluid, or perforation. (See: **Abdominal Sepsis/Suspected Abdominal Sepsis) (AB-3)**

- For the evaluation of non-operative treatment of acute appendicitis:
  - One-time CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for EITHER of the following:
    - symptoms suspicious for recurrent appendicitis OR
    - post non-operative treatment follow-up
- For the evaluation of splenic etiologies including suspected splenic infarct or abscess in the presence of concerning clinical features (e.g., severe abdominal pain and tenderness, fever, or history of atrial fibrillation):
  - CT Abdomen without and with contrast (CPT® 74170) or
  - CT Abdomen with contrast (CPT® 74160)
- For the evaluation of suspected small or large bowel etiologies (e.g., ischemia, obstruction, volvulus, or perforation):
  - CT Abdomen with contrast (CPT® 74160) or
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- For the evaluation of suspected gastroenteritis and/or enterocolitis in the presence of any red flag findings or clinical concern for complication (e.g., abscess, perforation, obstruction, toxic megacolon, or ischemia):
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - If no red flag findings are present, initial evaluation should include history and physical exam, as well as relevant laboratory testing and/or abdominal x-ray.
      - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary following initial evaluation when:
        - Prior abdominal radiography demonstrates a need for additional imaging or does not explain symptoms; **or**
        - Laboratory studies related to the current episode are non-diagnostic or do not identify a specific etiology
    - For suspected ischemic enterocolitis, see: **Mesenteric Ischemia (AB-6.1)** or **Colonic Ischemia (Including Ischemic Colitis) (AB-6.2)**
    - For known or suspected IBD, see: **IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)**

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- For pain described as pelvic, see: **Pelvic Pain/Dyspareunia, Female (PV-11.1)**, **Male Pelvic Disorders (PV-19.1)** or other appropriate sections based on likely etiology.

Evidence Discussion

Abdominal pain encompasses a wide differential, ranging from benign to life-threatening conditions. Initial evaluation relies on history, physical examination, and targeted laboratory testing to establish pretest probability and guide imaging selection (Yew et al., 2023; BMJ Best Practice, 2025). This approach supports appropriate modality use while limiting unnecessary radiation and resource utilization.

In low-risk presentations, ultrasound is an appropriate first-line modality. It is widely available, cost-effective, and avoids ionizing radiation and contrast exposure. It performs well in hepatobiliary and gynecologic conditions and is recommended for right upper quadrant and pelvic pain (Russo et al., 2023; Brook et al., 2024). Its limitations include reduced sensitivity for bowel, retroperitoneal, and gas-obscured pathology (Scheirey et al., 2018; Chang et al., 2020).

In pregnant individuals and other radiation-sensitive populations, ultrasound remains the preferred initial imaging modality because it avoids ionizing radiation while providing diagnostic information for many causes of abdominal pain. When ultrasound is nondiagnostic or evaluation of deeper abdominal structures is required, MRI serves as the preferred second-line modality because it offers excellent soft tissue characterization without fetal radiation exposure. This ultrasound-to-MRI pathway is supported by current recommendations and may be particularly important later in pregnancy, when physiologic and anatomic changes can limit ultrasound visualization (ACOG, 2017; ACR Expert Panel on Gastrointestinal Imaging et al., 2023).

CT of the abdomen and pelvis is preferred when ultrasound is nondiagnostic or when clinical features suggest serious pathology. It offers high diagnostic accuracy, rapid acquisition, and comprehensive evaluation of inflammatory, obstructive, and ischemic conditions, including appendicitis, diverticulitis, and bowel obstruction (Scheirey et al., 2018; Chang et al., 2020; American College of Radiology et al., 2021). CT also identifies alternative diagnoses in individuals with nonlocalized or atypical presentations.

In diverticulitis, CT confirms diagnosis and identifies complications such as abscess, perforation, fistula, or obstruction. Follow-up colonoscopy after resolution may be indicated in selected individuals, particularly those with complicated diverticulitis, atypical imaging findings, or features concerning for an underlying malignancy, such as mass-like wall thickening or regional lymphadenopathy (Hall et al., 2020; Schultz et al., 2020). This reflects the limitation of imaging alone in distinguishing inflammation from neoplasm.

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Appendicitis evaluation integrates clinical scoring systems with imaging. Tools such as the Appendicitis Inflammatory Response score (AIR) improve risk stratification but do not replace imaging in adult populations (Andersson & Stark, 2025). Ultrasound is often used initially, but indeterminate results are common. CT provides definitive diagnosis and reduces missed cases and negative appendectomy rates (Doubova et al., 2025; Moris et al., 2021). In non-operative management, CT also assesses treatment response and detects complications or recurrence (Podda et al., 2026; Talan & Di Saverio, 2021).

CT is also the preferred modality for suspected small bowel obstruction due to its ability to localize obstruction and detect complications such as ischemia (Chang et al., 2020). MRI serves as an alternative when radiation avoidance is required, though its use is limited by longer acquisition times, motion sensitivity, and reduced detection of free air and calculi (ACR Expert Panel on Gastrointestinal Imaging et al., 2023).

Overall, imaging in abdominal pain follows a tiered strategy. Ultrasound serves as an initial modality in lower-risk scenarios, while CT provides definitive evaluation in acute, complex, or indeterminate cases. This approach aligns with current appropriateness criteria and supports efficient, evidence-based care (Yew et al., 2023;Russo et al., 2023; Scheirey et al., 2018).

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Right Upper Quadrant and Epigastric Pain (AB-2.3)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- For pregnant individuals, see: **General Guidelines (AB-1.0): Pregnancy Considerations for Imaging**
- For the evaluation of right upper quadrant pain in the absence of red flag findings:
  - Abdominal ultrasound (complete or limited) (CPT® 76700 or CPT® 76705) is the initial diagnostic test
  - CT Abdomen with contrast (CPT® 74160) or MRCP/MRI (MRI Abdomen without or without and with contrast) (CPT® 74181 or CPT® 74183) if ultrasound is equivocal or nondiagnostic
- For the evaluation of epigastric pain or dyspepsia in the absence of red flag findings:
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705) to assess for biliary/ pancreatic disease is the initial study
  - CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183), or MRCP (CPT® 74181 or CPT® 74183), is considered medically necessary to further evaluate non-diagnostic findings on ultrasound
    - The use of these advanced imaging procedures to evaluate abnormalities identified on the initial ultrasound may be addressed in the relevant condition-specific guideline. Refer to the applicable dedicated guideline for additional clinical indications and imaging recommendations.
  - CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary for persistent symptoms after a negative or inconclusive ultrasound as well as ONE of the following:
    - Test and treat for Helicobacter pylori (H. pylori) and a trial of acid suppression with a proton pump inhibitor (PPI) for 4-8 weeks if eradication is successful, but symptoms do not resolve OR
    - An empiric trial of acid suppression with a PPI for 4-8 weeks
- Hepatobiliary System Imaging (HIDA) with OR without pharmacologic intervention (CPT® 78226 or CPT® 78227) is considered medically necessary for ANY of the following:

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- If there is right upper quadrant pain or epigastric pain and there is a suspicion of gallbladder disease, with a normal, equivocal, or non-diagnostic recent ultrasound, CT, or MRI
  - If findings on US suggest acute cholecystitis in a symptomatic individual (presence of gallstones with gallbladder wall thickening, Murphy's sign, and peri-cholecystic fluid) then a HIDA scan is generally considered not medically necessary.
  - If the HIDA without pharmacologic intervention (CPT® 78226) is initially performed and is normal or inconclusive, the site can convert the study to HIDA with pharmacologic intervention (CPT® 78227). The member will not need to return for a second study with injection of a pharmaceutical.
- Suspected bile leak after trauma or surgery
- Monitoring of liver regeneration
- Assessment of liver transplant
- Assessment of choledochal cyst
- Pre-operative assessment prior to partial hepatectomy
- Chronic acalculous cholecystitis
- Biliary dyskinesia
- Functional gallbladder disease
- Sphincter of Oddi dysfunction

Special Considerations for Suspicion of Pancreatic Cancer

CT Abdomen with contrast (CPT® 74160), CT Abdomen and Pelvis with contrast (CPT® 74177), or MRI Abdomen without and with contrast (CPT® 74183) is appropriate for suspicion of pancreatic cancer in individuals aged 60 years or older with unintentional weight loss and any ONE of the following:

- diarrhea
- back pain
- abdominal pain
- nausea
- vomiting
- constipation
- new onset diabetes
- abnormal lab results raising the possibility of pancreatic cancer (e.g., elevated CA 19-9, Gamma-Glutamyl Transpeptidase (GGTP), alkaline phosphate (ALKP), or bilirubin)
- non-diagnostic or negative prior US

If none of the above signs or symptoms applies, follow criteria for epigastric pain and dyspepsia.

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See also: **Pancreatic Cancer-Suspected Diagnosis (ONC-13.2)** in the Oncology Imaging Guidelines

Evidence Discussion

Right upper quadrant and epigastric pain have a broad differential that includes peptic, biliary, pancreatic, and malignant causes. In presentations consistent with dyspepsia, initial management is typically non-imaging based, using empiric acid suppression, Helicobacter pylori testing, and selective endoscopy (Moayyedi et al., 2017).

When non-peptic pathology is suspected, ultrasound is the preferred initial imaging modality. It is widely available, avoids ionizing radiation, and provides effective evaluation of hepatobiliary disease, including cholelithiasis, biliary dilation, and mass lesions (Russo et al., 2023; Vij et al., 2021). Its limitations include reduced sensitivity for bowel, retroperitoneal, and gas-obscured pathology (Vij et al., 2021; Scheirey et al., 2018).

If ultrasound is nondiagnostic or discordant with clinical findings, cross-sectional imaging is indicated. CT is preferred for suspected pancreatitis and acute inflammatory conditions due to its diagnostic accuracy and rapid acquisition (Vij et al., 2021; American College of Radiology et al., 2021). MRI and MRCP are appropriate for further characterization of biliary or pancreatic abnormalities, particularly when radiation avoidance is desired (Vij et al., 2021; ACOG Committee on Obstetric Practice, 2017). MRI offers superior soft tissue contrast but is more time-intensive and less sensitive for extraluminal air and calculi (Vij et al., 2021).

Hepatobiliary scintigraphy (HIDA) provides functional assessment when structural imaging is inconclusive. It evaluates bile flow and gallbladder ejection fraction, supporting diagnosis of cystic duct obstruction, biliary dyskinesia, and bile leaks (Russo et al., 2023; Vij et al., 2021). Its role in pancreatic disease is limited, as cross-sectional and endoscopic modalities offer higher diagnostic yield (Aslanian et al., 2020).

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Abdominal Sepsis (Suspected Abdominal Abscess) (AB-3)

Guideline

Abdominal Sepsis/Abscess (AB-3.1)
Reference (AB-3)

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Abdominal Sepsis/Abscess (AB-3.1)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- For abdominal symptoms associated with fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher) and/or elevated white blood cell count (greater than 10,000 cells/mm³, or above the upper limit of normal for the particular lab reporting the result) ANY of the following are considered medically necessary:
  - CT Abdomen with contrast (CPT® 74160)
  - CT Pelvis with contrast (CPT® 72193)
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- For intraperitoneal abscess:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - Follow-up imaging when clinically indicated to assess treatment response, disease progression, or abscess resolution or complications.
- For follow-up imaging of known abnormal fluid collections after medical management or catheter drainage, ANY of the following are considered medically necessary:
  - Serial Ultrasound (CPT® 76705)
  - CT Abdomen with contrast (CPT® 74160)
  - CT Pelvis with contrast (CPT® 72193)
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - The interval between studies should be guided by the individual's clinical course, including change in symptoms, laboratory findings, or need for procedural or surgical decision-making.

Evidence Discussion

Suspected intra-abdominal sepsis or abscess represents a time-sensitive clinical scenario that warrants immediate escalation to advanced imaging. Individuals presenting with abdominal symptoms accompanied by fever, leukocytosis, neutropenia, or other red-flag/high-risk features should undergo prompt CT of the abdomen and pelvis with intravenous contrast. CT provides rapid, comprehensive evaluation and is highly effective in identifying abscesses, source control targets, and complications of intra-abdominal infection (Bonomo et al., 2024; Brixey et al., 2024; Scheirey et al., 2018).This approach is particularly important in immunocompromised individuals, in whom serious intra-abdominal infection may present with subtle or atypical clinical findings.

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Following diagnosis and intervention, interval imaging may be required to monitor resolution or guide further management. This is particularly relevant after percutaneous drainage of fluid collections. Both CT and ultrasound are appropriate for serial assessment, with modality selection guided by the need for anatomic detail, radiation considerations, and procedural planning. The timing of follow-up imaging is not fixed and should be individualized based on clinical response and disease severity (Weiss et al., 2020).

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Flank Pain, Rule Out or Known Renal/ Ureteral Stone (AB-4)

Guideline

Ultrasound (AB-4.0)
Suspected Renal/Ureteral Stone(s) (AB-4.1)
Observation of Known Renal/Ureteral Stone(s) (AB-4.2)
Follow-Up of Treated Renal/Ureteral Stone (AB-4.3)
Annual Surveillance (AB-4.4)
Nuclear Kidney Imaging (AB-4.5)
References (AB-4)

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Ultrasound (AB-4.0)

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Criteria

- For the evaluation of flank pain and/or suspected renal or ureteral calculi, retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is considered medically necessary in place of CT Abdomen and Pelvis for any initial or follow-up indications, when requested by provider.

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Suspected Renal/Ureteral Stone(s) (AB-4.1)

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Criteria

- CT Abdomen and Pelvis without contrast (CPT® 74176) is considered medically necessary for ANY of the following:
  - Suspected renal/ureteral stone with symptoms in non-pregnant adults (e.g., flank pain or renal colic) OR
  - Suspected staghorn calculi
- CT Abdomen and Pelvis without contrast (CPT® 74176) or CT Urogram (CPT® 74178) is considered medically necessary for the following:
  - Suspected renal/ureteral stones (e.g., flank pain or renal colic) with hematuria
- Ultrasound (CPT® 76770 or CPT® 76775) or MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195) is considered medically necessary for the following:
  - Suspected renal/ureteral stone in pregnant individuals (e.g., flank pain or renal colic)
    - The use of gadolinium contrast agents is contraindicated during pregnancy unless the specific clinical need for that procedure outweighs risk to the fetus.
- For suspected renal or ureteral stone in pediatric individuals (e.g., flank pain or renal colic)
  - See: **Flank Pain, Renal Stone (PEDAB-4)** in the Pediatric Abdomen Imaging Guidelines

Evidence Discussion

Non-contrast CT (NCCT) is the preferred initial imaging modality for adults presenting with acute flank pain and suspected urolithiasis. It provides high sensitivity and specificity for detecting ureteral calculi, accurately characterizes stone size, location, overall stone burden, and identifies complications such as obstruction or infection. CT is particularly valuable in suspected staghorn calculi because it accurately delineates stone burden and collecting-system anatomy for treatment planning. NCCT also allows evaluation of alternative causes of abdominal or flank pain, which is essential in undifferentiated presentations (Expert Panel on Urological Imaging et al., 2023; Shastri et al., 2023). In individuals presenting with suspected stone disease and associated hematuria, CT-based evaluation may also assist in excluding alternative urinary tract pathology when clinically indicated (Expert Panel on Urological Imaging et al., 2023).

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In pregnancy, ultrasound is recommended as the first-line modality due to avoidance of ionizing radiation. If ultrasound is nondiagnostic and clinical suspicion persists, non-contrast MRI may be used for further evaluation (Juliebø-Jones et al., 2022; American College of Obstetricians and Gynecologists' Committee on Obstetric Practice, 2017).

When NCCT is inconclusive or when complications or alternative diagnoses are suspected, contrast-enhanced imaging, including CT urography or MRI, may be warranted to clarify findings and guide management (Expert Panel on Urological Imaging et al., 2023; Shastri et al., 2023).

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Observation of Known Renal/Ureteral Stone(s) (AB-4.2)

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Criteria

- Radiopaque Stones
  - Initial follow-up imaging:
    - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) and kidneys, ureters, and bladder (KUB) x-ray
  - Subsequent follow-up imaging:
    - If initial follow-up ultrasound and KUB are negative, and there is no hematuria and individual is asymptomatic:
      - See: **Annual Surveillance (AB-4.4)**
    - If initial follow-up ultrasound and KUB demonstrates hydronephrosis, retained stone, or if the individual has persistent hematuria, or is symptomatic:
      - CT Abdomen and Pelvis without contrast (CPT® 74176)
- Non-radiopaque Stones (i.e., radiolucent)
  - Initial follow-up imaging:
    - CT Abdomen and Pelvis without contrast (CPT® 74176)
  - Subsequent follow-up imaging:
    - If CT is negative:
      - See: **Annual Surveillance (AB-4.4)**
    - If CT demonstrates a retained stone, hydronephrosis, or if the individual is being evaluated for surgery:
      - Further imaging can be considered on an individual basis
- ANY of the following are considered medically necessary for surgical/procedural evaluation of staghorn calculi:
  - CT Abdomen and Pelvis (contrast as requested)
  - 3-D reconstruction (CPT® 76377 or CPT® 76376)
  - Nuclear kidney imaging (CPT® 78707, CPT® 78708, or CPT® 78709) when there is concern for a poorly functioning kidney

Background and Supporting Information

- Radiopaque versus radiolucent stones on plain radiograph:
  - Radiopaque
    - Calcium-based stones (70-80%)

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    - Struvite stones (triple phosphate) (usually opaque but variable – 15-20%)
  - Radiolucent
    - Uric acid (5-10%)
    - Cystine (1-3%)
    - Medication stones (e.g. indinavir) (1%)

Evidence Discussion

Follow-up imaging for known renal and ureteral calculi should balance diagnostic sensitivity with cumulative radiation exposure. For many stable individuals with known radiopaque stones, ultrasound and plain radiography (KUB) provide adequate surveillance while reducing radiation burden. Ultrasound offers a radiation-free option for longitudinal monitoring and can detect hydronephrosis and larger calculi, whereas KUB may be useful for tracking interval growth of known radiopaque stones (NICE, 2019; Pearle et al., 2026; Shastri et al., 2023).

Non-contrast CT (NCCT) remains the most sensitive modality for assessing stone size, location, and interval change. Its reproducibility supports precise assessment of disease progression and treatment response, making it particularly useful when accurate measurement is needed or when ultrasound or KUB findings are inconclusive. However, repeated CT examinations may increase cumulative radiation exposure (Pearle et al., 2026; Shastri et al., 2023).

Evidence comparing ultrasound and CT suggests similar overall diagnostic outcomes in selected clinical contexts, supporting ultrasound as an acceptable surveillance strategy when the risk of progression is low and clinical stability is maintained (Shastri et al., 2023; Pearle et al., 2026).

Plain radiography (KUB) has a limited but specific role in follow-up of radiopaque calculi. It is most useful for assessing interval growth or migration of known visible stones but lacks sensitivity for initial detection and for radiolucent calculi (Pearle et al., 2026; Shastri et al., 2023).

MRI is not routinely used for stone surveillance. Although it avoids radiation exposure, calculi are poorly visualized on MRI, limiting its diagnostic utility despite advantages in soft tissue imaging (Shastri et al., 2023).

Overall, imaging selection should be individualized according to stone characteristics, clinical status, and the need to minimize radiation exposure. While CT provides the highest diagnostic accuracy, ultrasound and KUB are appropriate surveillance options for many individuals with stable, known stone disease (Pearle et al., 2026; NICE, 2019; Shastri et al., 2023).

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Follow-Up of Treated Renal/Ureteral Stone (AB-4.3)

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Criteria

- Post-shock wave lithotripsy (SWL):
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is the appropriate initial follow-up imaging.
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) and/or CT Abdomen and Pelvis (contrast as requested) is considered medically necessary for ANY of the following:
    - Individuals who are symptomatic
    - Individuals with hydronephrosis
    - Individuals who have residual fragments
  - Individuals treated by SWL who have passed fragments, are asymptomatic, and without hydronephrosis can be followed according to **Annual Surveillance (AB-4.4)**.
- Post-medical expulsive therapy (MET):
  - Retroperitoneal ultrasound is considered medically necessary for individuals treated by MET who have passed a stone and are symptomatic.
  - CT Abdomen and Pelvis (contrast as requested) is considered medically necessary if hydronephrosis is demonstrated with ultrasound.
  - Individuals treated by MET who have passed a stone and are asymptomatic can be followed according to **Annual Surveillance (AB-4.4)**.
- Post-ureteroscopic extraction with an intact stone:
  - Retroperitoneal ultrasound is considered medically necessary for individuals without symptoms.
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for individuals with symptoms or hydronephrosis demonstrated on ultrasound.
  - Individuals without symptoms or without hydronephrosis demonstrated on ultrasound can be followed according to **Annual Surveillance (AB-4.4)**.
- Post-ureteroscopic extraction requiring fragmentation of the stone(s):
  - Retroperitoneal ultrasound is considered medically necessary for individuals without symptoms.

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  - CT Abdomen and Pelvis without contrast (CPT® 74176) is considered medically necessary for individuals without symptoms, but hydronephrosis demonstrated on ultrasound.
  - Individuals without symptoms or without hydronephrosis demonstrated on ultrasound can be followed according to **Annual Surveillance (AB-4.4)**.
  - Retroperitoneal ultrasound and KUB for individuals with symptoms and a radiopaque stone
  - CT Abdomen and Pelvis without contrast (CPT® 74176) is considered medically necessary for individuals with symptoms and a non-radiopaque stone.
- Post-surgical/procedural treatment of staghorn calculi:
  - CT Abdomen and Pelvis without contrast (CPT® 74176)
  - Retroperitoneal ultrasound and/or CT Abdomen and Pelvis (contrast as requested) is considered medically necessary for individuals with persistent symptoms and/or hydronephrosis.

Evidence Discussion

Following treatment of renal calculi, ultrasound is the preferred initial modality for follow-up. It allows assessment for residual stones and detection of hydronephrosis without exposing individuals to ionizing radiation (Pearle et al., 2019; Shastri et al., 2023). In asymptomatic individuals, periodic surveillance with ultrasound is appropriate to monitor for recurrence or progression (NICE, 2019; Pearle et al., 2019).

CT imaging is reserved for individuals with recurrent symptoms or when ultrasound identifies concerning findings such as hydronephrosis or equivocal results. In these cases, non-contrast CT provides definitive evaluation of residual or recurrent stone burden and guides further management (Pearle et al., 2019; Shastri et al., 2023).

This approach balances diagnostic accuracy with minimization of cumulative radiation exposure in individuals requiring longitudinal monitoring (NICE, 2019; Pearle et al., 2019; Shastri et al., 2023).

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Annual Surveillance (AB-4.4)

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Criteria

- Annual surveillance is considered medically necessary for stable individuals with a history of stones to assess for stone growth or formation of new stones:
  - Plain x-ray (KUB) is considered medically necessary for individuals with radiopaque stones.
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is the preferred modality for individuals with non-radiopaque stones.

Evidence Discussion

For surveillance of known urolithiasis, imaging selection is guided by stone composition and the need to limit radiation exposure. Plain radiography (KUB) is a cost-effective and accessible option for monitoring radiopaque stones, allowing assessment of interval growth or stability (Pearle et al., 2019; Shastri et al., 2023).

Ultrasound is preferred for individuals with radiolucent stones and for those requiring repeated imaging, as it avoids ionizing radiation while providing adequate assessment for stone burden and associated hydronephrosis (NICE, 2019; Pearle et al., 2019; Shastri et al., 2023).

In clinically stable individuals, annual imaging is reasonable for surveillance. The interval may be shortened or extended based on stone activity, recurrence risk, or changes in symptoms. This risk-adapted approach aligns follow-up intensity with disease behavior while minimizing unnecessary imaging (Pearle et al., 2019; NICE, 2019).

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Nuclear Kidney Imaging (AB-4.5)

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Criteria

- Nuclear kidney imaging (CPT® 78707, CPT® 78708, or CPT® 78709) is considered medically necessary for the evaluation of the following:
  - Recurrent flank pain when CT and ultrasound are non-diagnostic OR
  - Prior imaging (CT or ultrasound) shows hydronephrosis and to determine if this is truly obstructive in nature

Evidence Discussion

Renal scintigraphy is particularly useful when CT or ultrasound demonstrates hydronephrosis and clarification is needed regarding the presence of functional obstruction. By assessing renal perfusion, drainage, and differential renal function, it can distinguish true urinary tract obstruction from non-obstructive dilation, helping guide management decisions when anatomic imaging findings are indeterminate (Wong-You-Cheong et al., 2021; ACR Appropriateness Criteria, 2022).

Renal scintigraphy may also be valuable in individuals with recurrent flank pain when CT, ultrasound, or other anatomic imaging studies are nondiagnostic but clinical suspicion for obstruction persists. In addition, it can provide information regarding differential renal function, including assessment of split renal contribution and evaluation of renal transplant function (Wong-You-Cheong et al., 2021; ACR Appropriateness Criteria, 2022).

Due to its relatively low radiation exposure, renal scintigraphy remains an appropriate option when repeated functional assessment is required, including select pediatric and longitudinal follow-up settings (Wong-You-Cheong et al., 2021).

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Mesenteric/Colonic Ischemia (AB-6)

Guideline

Mesenteric Ischemia (AB-6.1)
Colonic Ischemia (Including Ischemic Colitis) (AB-6.2)
References (AB-6)

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Mesenteric Ischemia (AB-6.1)

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Criteria

Acute Mesenteric Ischemia

- For suspicion of acute mesenteric ischemia, ONE of the following imaging studies is considered medically necessary:
  - CTA Abdomen and/or Pelvis (Mesenteric protocol) (CPT® 74175, or CPT® 74174, or CPT® 72191) (preferred initial imaging modality), OR
  - MRA Abdomen and/or Pelvis (CPT® 72198 and/or CPT® 74185), OR
  - CT Abdomen and Pelvis with contrast (CPT® 74177)

Chronic Mesenteric Ischemia

- For suspicion of chronic mesenteric ischemia:
  - Mesenteric Artery Duplex Ultrasound (CPT® 93975 or CPT® 93976) and/or ONE of the following:
    - CTA Abdomen and Pelvis (CPT® 74174) OR
    - MRA Abdomen and Pelvis (CPT® 74185 and CPT® 72198)
- For clinical concern of median arcuate ligament syndrome, see: **Median Arcuate Ligament Syndrome, Nutcracker Syndrome and other Abdominal Vascular Compression Syndromes (PVD-18)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines
- For suspicion of superior mesenteric artery syndrome, see: **Superior Mesenteric Artery (SMA) Syndrome (AB-20.4)**

Pre- and Post-Treatment for Mesenteric Ischemia

- Pre-operative evaluation, if not already performed (including prior to endovascular intervention):
  - CTA Abdomen and Pelvis (CPT® 74174)
- Post-procedure surveillance imaging following invasive treatment for mesenteric ischemia (celiac, superior mesenteric, and inferior mesenteric angioplasty with or without stenting, or mesenteric artery bypass grafting):
  - Baseline Duplex Ultrasound (CPT® 93975 or CPT® 93976) within 1 month of the procedure
  - Duplex Ultrasound (CPT® 93975 or CPT® 93976) at 6 months, 12 months, 18 months, and 24 months, then annually thereafter

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- CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) or CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen (CPT® 74185) and if requested, MRA Pelvis (CPT® 72198):
  - For symptoms suggesting recurrent ischemia OR
  - In the absence of symptoms, following a Duplex Ultrasound if, on the Duplex study:
    - Celiac axis:
      - Peak systolic velocity (PSV) greater than 370 cm/s or a substantial increase from the post-treatment baseline PSV (substantial increase has not been defined), or demonstration of restenosis of 70% or greater
    - Superior mesenteric artery:
      - PSV greater than 420 cm/s, or a substantial increase from the post-treatment baseline PSV (substantial increase has not been defined), or demonstration of restenosis of 70% or greater
    - Inferior mesenteric artery:
      - Substantial increase from the post-treatment baseline PSV (substantial increase has not been defined)

Surveillance of Asymptomatic Mesenteric Artery Occlusive Disease

- Annual Mesenteric Artery Duplex Ultrasound (CPT® 93975 or CPT® 93976)

Evidence Discussion

Mesenteric ischemia reflects impaired intestinal perfusion due to arterial occlusion, venous thrombosis, or systemic hypoperfusion. Acute mesenteric ischemia most commonly arises from embolic or thrombotic arterial disease, with mesenteric venous thrombosis representing a smaller subset. Clinical presentation is characterized by severe abdominal pain that exceeds examination findings, particularly in individuals with cardiovascular disease, atrial fibrillation, or hypercoagulable states (Ahmed, 2021; Bala et al., 2022). Given the high mortality associated with delayed diagnosis, rapid and accurate imaging is essential (Ahmed, 2021; Bala et al., 2022).

Current guidelines consistently identify computed tomography angiography (CTA) as the first-line imaging modality in suspected acute mesenteric ischemia. CTA enables simultaneous evaluation of mesenteric vessels and bowel viability, allowing detection of occlusion, ischemic injury, and complications such as pneumatosis (Bala et al., 2022; Koelemay et al., 2025). This supports its central role in criteria addressing acute diagnostic imaging.

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Chronic mesenteric ischemia is typically caused by progressive atherosclerotic disease affecting the mesenteric arteries. Symptoms such as postprandial pain, weight loss, and food avoidance reflect limited perfusion during increased metabolic demand. While multivessel disease is most common, clinically significant ischemia may occur with single-vessel involvement when collateral circulation is insufficient (Huber et al., 2021; Koelemay et al., 2025). Revascularization is recommended once symptomatic disease is confirmed (Huber et al., 2021; Koelemay et al., 2025).

For chronic disease and asymptomatic mesenteric artery occlusive disease, duplex ultrasound is supported as an appropriate first-line and surveillance modality. It provides a noninvasive assessment of flow velocities with high negative predictive value for excluding significant stenosis under optimal conditions (Zierler et al., 2018). Its role is particularly relevant for longitudinal follow-up after revascularization and in monitoring individuals without symptoms (Zierler et al., 2018; Koelemay et al., 2025).

Cross-sectional imaging with CTA, and in selected cases magnetic resonance angiography (MRA), is recommended for confirmatory diagnosis and pre-intervention planning. CTA offers detailed anatomic characterization of stenosis and collateral circulation, which is essential for procedural decision-making. MRA demonstrates high diagnostic accuracy but is limited by availability and reduced ability to assess calcification (Lam et al., 2022; Koelemay et al., 2025).

Across clinical contexts, imaging selection reflects a consistent framework. Acute presentations require immediate, high-resolution vascular imaging, favoring CTA. Chronic and asymptomatic disease allow for an initial duplex-based approach, followed by CTA or MRA when intervention is considered. Post-treatment and surveillance strategies prioritize duplex ultrasound due to its safety profile and suitability for repeated assessment. These recommendations align with contemporary vascular and radiologic guidelines and provide a clear evidence base for criteria addressing diagnosis, treatment planning, and longitudinal surveillance (Bala et al., 2022; Koelemay et al., 2025; Zierler et al., 2018).

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Colonic Ischemia (Including Ischemic Colitis) (AB-6.2)

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Criteria

- If colonic ischemia is suspected in the setting of significant abdominal pain, CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary as the initial imaging modality if ANY of the following:
  - rectal bleeding OR
  - moderate or severe abdominal tenderness OR
  - fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher) OR
  - guarding, rebound tenderness, or other peritoneal signs OR
  - elevated WBC (defined as greater than 10,000 cells/mm³, or above the upper limit of normal for the particular lab reporting the result)
- Repeat imaging for asymptomatic or improving individuals, including routine post-operative imaging, is generally considered not medically necessary.
- CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen (CPT® 74185) AND if requested, MRA Pelvis (CPT® 72198) is considered medically necessary for suspected right sided or pancolonic ischemia based on findings from the initial CT Abdomen and Pelvis.

Background and Supporting Information

- Clinical features concerning for colonic ischemia include sudden-onset cramping abdominal pain accompanied by urgency to defecate and passage of bright red blood, maroon blood, or bloody diarrhea, particularly in individuals with cardiovascular disease, diabetes mellitus, kidney disease, previous abdominal surgery, use of constipating medications, chronic obstructive pulmonary disease (COPD), or atrial fibrillation (Ahmed, 2021; Brandt et al., 2015). In the appropriate clinical setting, advanced imaging may be warranted to evaluate for ischemic injury and associated complications.

Evidence Discussion

Colonic ischemia is usually caused by transient hypoperfusion rather than persistent arterial occlusion. By the time of presentation, mesenteric blood flow has often normalized, so imaging findings reflect mucosal injury rather than ongoing ischemia. This distinction explains why routine vascular imaging is not appropriate in most cases and why CT, rather than CTA, is emphasized (Brandt et al., 2015).

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Contrast-enhanced CT is the preferred initial modality in individuals with clinically significant symptoms, including abdominal pain with objective findings such as tenderness, fever, leukocytosis, or rectal bleeding. CT provides sufficient information to confirm suspected ischemia, exclude alternative diagnoses, and assess severity, which supports restricting imaging to individuals with higher pre-test probability rather than nonspecific symptoms (Brandt et al., 2015; Ginsburg et al., 2018).

Repeat imaging is not routinely indicated because radiographic findings may persist after clinical improvement and do not reliably guide ongoing management. Limiting repeat studies reduces unnecessary radiation exposure without compromising clinical care. Imaging is therefore reserved for individuals with worsening symptoms or concern for complications (Brandt et al., 2015; Ginsburg et al., 2018).

CTA or MRA is selectively appropriate when initial CT demonstrates right-sided or pancolonic involvement. This distribution is associated with proximal mesenteric arterial disease and worse outcomes, representing a higher-risk subgroup in which vascular imaging may alter management (Brandt et al., 2015).

This evidence supports criteria that restrict initial imaging to symptomatic individuals with objective findings, discourage routine repeat imaging, and reserve vascular imaging for anatomically high-risk presentations (Brandt et al., 2015; Ginsburg et al., 2018).

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Post-Operative Pain Within 60 Days Following Abdominal Surgery – Abdominal Procedure (AB-7)

Guideline

Post-Op Pain and/or Complication Within 60 Days (AB-7.1)
References (AB-7)

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Post-Op Pain and/or Complication Within 60 Days (AB-7.1)

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Criteria

- CT Abdomen and/or Pelvis with contrast (CPT® 74177, or CPT® 74160, or CPT® 72193) is considered medically necessary for suspected post-operative/post-procedure complications (e.g., bowel obstruction, abscess, anastomotic leak, or post-endoscopic complication).
- Beyond 60 days post-operatively, see: **Abdominal Pain (AB-2)**.
- For liver post-transplant indications and imaging, see: **Liver Transplant, Post-Transplant Imaging (AB-42.3)**
- For kidney post-transplant indications and imaging, see: **Kidney Transplant, Post Transplant (AB-42.6)**
- For suspected ureter or bladder injury indications and imaging, see **Ureteral and/or Bladder Trauma of Injury (PV-25.1)**

Evidence Discussion

Post-operative and post-procedural abdominal complications most commonly occur within the first 60 days and require prompt evaluation when suspected. Early imaging is necessary to identify conditions such as bowel obstruction, abscess, and anastomotic leak, all of which carry significant morbidity if diagnosis is delayed (O'Malley & Revels, 2020; Scheirey et al., 2018).

Contrast-enhanced CT is the primary imaging modality in this setting due to its speed, availability, and high diagnostic accuracy across a broad range of complications (Caraiani et al., 2020; Pietryga et al., 2025). CT effectively identifies intra-abdominal fluid collections, differentiates seroma from hematoma or abscess, and detects complications such as leak or obstruction. The use of intravenous contrast improves detection of inflammatory changes and enhances delineation of post-operative anatomy (Caraiani et al., 2020; Pietryga et al., 2025). Detection of suspected anastomotic leak is a particularly important indication for contrast-enhanced cross-sectional imaging, as delayed diagnosis is associated with increased morbidity and mortality (Barbaro et al., 2021).

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Abdominal Lymphadenopathy (AB-8)

Guideline

Abdominal Lymphadenopathy (AB-8.1)
Inguinal Lymphadenopathy (AB-8.2)
Sclerosing Mesenteritis and Mesenteric Panniculitis (AB-8.3)
References (AB-8)

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Abdominal Lymphadenopathy (AB-8.1)

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Criteria

- History of malignancy
  - Refer to oncology guidelines specific for known malignancy
  - Biopsy may be considered
- For suspected lymphoproliferative disorder:
  - Imaging modality for biopsy is at the discretion of the interventional radiologist
    - Imaging studies performed as part of a CT-, MR-, or Ultrasound-guided procedure should be reported using appropriate CPT® codes
  - PET/CT (CPT® 78815) is considered medically necessary prior to biopsy in order to determine a more favorable site for biopsy, when a prior biopsy was nondiagnostic, or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.
- If clinical evaluation, laboratory findings, biopsy, or PET imaging suggest benign etiology, and no history of malignancy:
  - First follow-up imaging at 3 months
    - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary
  - Additional follow-up imaging at 6 and 12 months, if no improvement at 3 months
    - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary
  - Further imaging is considered NOT medically necessary if clinically significant changes are not seen within one year of follow-up imaging.
- If a follow-up CT demonstrates a concerning change, biopsy should be performed.
  - If biopsy is inconclusive, PET/CT (CPT® 78815) is considered medically necessary

Evidence Discussion

Abdominal lymphadenopathy has a broad differential that includes infectious, inflammatory, and malignant causes. Imaging alone is not sufficient for definitive diagnosis, and tissue sampling remains the standard when lymphoproliferative disease is suspected (Fowler et al., 2019; Kwon & Lee, 2025).

CT is the primary imaging modality for evaluation of intra-abdominal lymph nodes. It allows detection, characterization, and anatomic localization, and it is routinely used to guide percutaneous biopsy and to monitor interval change (Fowler et al., 2019; Heller et al., 2013). Serial imaging may be appropriate when clinical, laboratory, or prior biopsy

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findings suggest a benign or self-limited process, with consideration of cumulative radiation exposure (Heller et al., 2013; Fowler et al., 2019).

PET/CT provides functional assessment of metabolic activity but lacks specificity, as uptake may be seen in both malignant and benign conditions. Its role is therefore adjunctive (Zeman et al., 2021; Kwon & Lee, 2025). PET/CT is most useful when prior biopsy is inconclusive or when identifying the most appropriate site for tissue sampling in cases with multiple or inaccessible lymph nodes (Zeman et al., 2021; Fowler et al., 2019).

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Inguinal Lymphadenopathy (AB-8.2)

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Criteria

There is no evidence-based support for advanced imaging of clinically evidenced isolated inguinal lymphadenopathy without biopsy. Advanced imaging should be directed by results of biopsy. If biopsy results are negative or benign, then advanced imaging is considered not medically necessary.

- High suspicion of lymphoma: See **Non-Hodgkin Lymphomas (ONC-27)** and **Hodgkin Lymphoma (ONC-28)** in the Oncology Imaging Guidelines
- Prior history of malignancy: See **Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer (ONC-31)** in the Oncology Imaging Guidelines
- If biopsy is positive for malignancy, advanced imaging is guided by sections specific to the histological diagnosis.

Background and Supporting Information

- Localized inguinal lymphadenopathy should prompt:
  - search for adjacent extremity injury or infection (Falk et al., 2025; Walker et al., 2025)
  - 3 to 4 weeks of observation if clinical picture is benign (Falk et al., 2025; Walker et al., 2025)
  - excisional or image-guided core needle biopsy under ultrasound or CT guidance of most abnormal lymph node if condition persists or malignancy suspected (Falk et al., 2025; Walker et al., 2025)
- Generalized inguinal lymphadenopathy should prompt:
  - diagnostic work-up, including serological tests, for systemic diseases (Falk et al., 2025; Walker et al., 2025) and
  - excisional or image-guided core needle biopsy under ultrasound or CT guidance of most abnormal lymph node if condition persists or malignancy suspected (Falk et al., 2025; Kwon & Lee, 2025)

Evidence Discussion

Inguinal lymphadenopathy is frequently benign, often reactive to localized infection or inflammation, and commonly resolves without intervention. Clinical history and physical examination are often sufficient to establish the diagnosis, which supports a conservative initial approach (Falk et al., 2025; Walker et al., 2025).

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There is limited evidence supporting the use of advanced cross-sectional imaging in the initial evaluation of isolated inguinal lymphadenopathy. Given the high prevalence of benign causes and low pre-test probability of malignancy, routine imaging would result in low diagnostic yield and potential overutilization (Falk et al., 2025; Walker et al., 2025).

Imaging becomes appropriate only when biopsy results or clinical findings indicate a need for further staging or characterization. If evaluation confirms a benign etiology, no imaging follow-up is warranted (Falk et al., 2025; Kwon & Lee, 2025).

This framework supports criteria that restrict imaging in low-risk presentations, prioritize tissue diagnosis, and limit advanced imaging to cases where results will change management (Falk et al., 2025; Kwon & Lee, 2025).

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Sclerosing Mesenteritis and Mesenteric Panniculitis (AB-8.3)

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Criteria

- For new or worsening clinical symptoms in an individual with a diagnosis of sclerosing mesenteritis or mesenteric panniculitis:
  - CT Abdomen and Pelvis without and with contrast (CPT® 74178) is considered medically necessary
- Requests for follow-up imaging in asymptomatic individuals or for sequential imaging to monitor for the development of malignancy is based upon size of lymph nodes:
  - For asymptomatic individuals with lymph nodes measuring less than 10mm, annual surveillance imaging is considered medically necessary for up to 2 consecutive years to confirm benign stability with either of the following:
    - CT Abdomen and/or Pelvis without and with contrast (CPT® 74170, 74178, 72194) OR
    - MRI Abdomen and/or Pelvis without and with contrast (CPT® 74183, 72197)
  - If lymph nodes are greater than or equal to 10mm, PET/CT (CPT® 78815) or biopsy is considered medically necessary.

Background and Supporting Information

Sclerosing mesenteritis is a rare idiopathic inflammatory disorder of the small-bowel mesentery characterized by varying degrees of chronic inflammation, fat necrosis, and fibrosis. Mesenteric panniculitis, mesenteric lipodystrophy, and retractile mesenteritis are generally considered manifestations along the same disease spectrum rather than distinct entities (Saha et al., 2024; Worthington et al., 2025).

The mesentery contains blood vessels, lymphatics, nerves, and adipose tissue that support the small intestine. Disease involvement may result in mass effect on adjacent bowel loops, mesenteric vessels, and other intra-abdominal structures. Progressive fibrosis may lead to complications such as bowel obstruction and vascular compromise (Saha et al., 2024; Sulbaran et al., 2023).

Characteristic imaging features are described by Coulier's criteria, and the diagnosis is generally supported when at least three of the following findings are present (Worthington et al., 2025):

- A mesenteric fatty mass that displaces adjacent structures without direct invasion
- Increased attenuation of mesenteric fat

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- Soft-tissue nodules or mesenteric lymph nodes within the affected mesentery
- A hypoattenuating fatty halo surrounding mesenteric vessels or lymph nodes
- A hyperattenuating pseudocapsule surrounding the mesenteric lesion

The etiology of sclerosing mesenteritis remains uncertain. Proposed mechanisms include prior abdominal surgery or trauma, autoimmune-mediated inflammation, ischemia, infection, and paraneoplastic processes (Saha et al., 2024; Sulbaran et al., 2023).

Evidence Discussion

Published data regarding the association between sclerosing mesenteritis and malignancy are inconsistent. Some studies and meta-analyses have demonstrated no significant increase in malignancy risk compared to the general population, whereas others suggest a modestly elevated long-term risk, particularly for lymphoma, with most cases identified within the first year following diagnosis (Saha et al., 2024; Worthington et al., 2025). This variability contributes to a lack of consensus regarding optimal surveillance strategies.

The role of imaging in disease monitoring is similarly uncertain. Although cross-sectional imaging may demonstrate changes in mesenteric inflammation, available evidence indicates limited correlation between radiologic findings and clinical symptoms or disease progression (Worthington et al., 2025). As a result, routine serial imaging in asymptomatic individuals has not been consistently supported by the literature (Saha et al., 2024; Worthington et al., 2025).

Evidence suggests that the likelihood of clinically significant progression is low in individuals with stable imaging findings over time. Studies have indicated that individuals without radiologic progression over an initial period (e.g., approximately two years) are unlikely to demonstrate subsequent clinically meaningful change, supporting a more conservative imaging approach in stable cases (Saha et al., 2024; Worthington et al., 2025).

Conversely, the presence of new or evolving imaging findings such as increasing mesenteric mass size, development of lymphadenopathy, or other concerning features may indicate an alternative or superimposed process, including malignancy, and warrants further diagnostic evaluation (Saha et al., 2024; Worthington et al., 2025). Taken together, the available evidence supports a risk-adapted approach to imaging, in which follow-up is guided by initial clinical and radiologic features, symptom progression, and the presence of concerning changes rather than routine long-term surveillance in all individuals (Saha et al., 2024; Worthington et al., 2025).

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Bariatric Surgery and Percutaneous Gastrostomy (AB-9)

Guideline

Bariatric Post-Operative Complications (AB-9.1)
Percutaneous Gastrostomy (AB-9.2)
References (AB-9)

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Bariatric Post-Operative Complications (AB-9.1)

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Criteria

- For the evaluation of post-operative complications:
  - CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen with contrast (CPT® 74160), or CTA Abdomen and Pelvis (CPT® 74174) is considered medically necessary for individuals who have had weight loss surgery and present with suspected complications evidenced by:
    - nausea or vomiting OR
    - abdominal pain or tenderness OR
    - fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher) OR
    - abdominal distension OR
    - suspected hernia
- Internal hernias in individuals who have had Roux-en-Y gastric bypasses may have intermittent and relatively mild abdominal symptoms which require immediate evaluation with CT imaging.
- See: **Post-Operative Pain Within 60 Days Following Abdominal Surgery – Abdominal Procedure (AB-7)**

Evidence Discussion

The American College of Radiology (ACR) classifies routine preoperative advanced imaging in bariatric candidates as usually not appropriate, given the low probability that such imaging alters surgical planning in the absence of specific clinical indications (Pietryga et al., 2025). This position aligns with cohort evidence showing that extensive preoperative testing rarely changes operative strategy at a meaningful rate, particularly when history, physical examination, and standard workup are unremarkable (Schneider et al., 2018; Ghaderi et al., 2020).

In contrast, post-operative evaluation requires a low threshold for advanced imaging. Bariatric procedures, particularly Roux-en-Y gastric bypass, introduce risks for complications that often present with nonspecific symptoms. These include internal hernia, anastomotic leak, marginal ulceration, stenosis, perforation, and intussusception (Shin & Kim, 2020; Pietryga et al., 2025). Splenic complications, most commonly infarction or abscess, have also been documented (Mousavimaleki et al., 2022). Clinical indicators such as abdominal pain or tenderness, nausea or vomiting, fever, abdominal

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distension, leukocytosis, or failure of expected weight loss should prompt immediate evaluation for post-operative complications (Edwards et al., 2025; Pietryga et al., 2025).

CT of the abdomen and pelvis with contrast is the primary diagnostic modality in this setting due to its high sensitivity across a broad range of complications. It enables assessment of bowel configuration, mesenteric anatomy, and extraluminal findings, and contrast enhancement improves detection of anastomotic leaks and inflammatory changes (Musella et al., 2018; Pietryga et al., 2025). Current post-operative pathways and imaging guidance consistently support CT as first-line imaging in symptomatic individuals (Edwards et al., 2025; Pietryga et al., 2025).

Internal hernia represents a time-sensitive complication after Roux-en-Y gastric bypass and often presents with intermittent or mild abdominal symptoms. This variability can delay diagnosis (Nawas et al., 2022; Kagoma & Gayer, 2018). CT is the preferred initial study and should be obtained promptly when hernia is suspected (Pietryga et al., 2025; Nawas et al., 2022). However, CT sensitivity is imperfect, and persistent clinical concern should prompt surgical evaluation, as diagnostic laparoscopy remains more definitive in this context (Altinoz et al., 2020; Nawas et al., 2022).

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Percutaneous Gastrostomy (AB-9.2)

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Criteria

- Percutaneous Endoscopic Gastrostomy (PEG)
  - CT Abdomen without (CPT® 74150) or CT Abdomen with contrast (CPT® 74160) is considered medically necessary:
    - For pre-operative assessment in the presence of:
      - abdominal wall defects (e.g., open abdomen) OR
      - the presence of “ostomy” sites or drain tubes OR
      - abdominal surgical scars or history of prior major abdominal surgery (e.g., laparotomy, laparoscopy) OR
      - known situs inversus OR
      - known paraesophageal hernia OR
      - previous endoscopic attempt did not achieve adequate transillumination through the abdominal wall or compression and a suitable site for PEG placement could not be determined
  - Percutaneous Gastrostomy via Interventional Radiologist using CT guidance
    - A pre-operative CT Abdomen without (CPT® 74150) or CT Abdomen with contrast (CPT® 74160) is considered medically necessary for complicated cases in which a safe window cannot be determined via fluoroscopy.
    - See above indications for CT prior to endoscopic or surgical gastrostomy tube placement for pre-operative indications.
  - Suspected complication of a gastrostomy or jejunostomy tube placed endoscopically or by interventional radiology (IR):
    - CT Abdomen without (CPT® 74150) or CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis without (CPT® 74176) or CT Abdomen and Pelvis with contrast (CPT® 74177)

Evidence Discussion

Routine pre-procedure CT imaging does not reduce complication rates in percutaneous endoscopic gastrostomy (PEG) placement. Retrospective data show no difference in bleeding, need for operative intervention, or tube-related complications between individuals who underwent CT prior to placement and those who did not. Complications related to interposed viscera are more directly linked to failure of proper endoscopic technique, particularly inadequate transillumination and external indentation, rather than absence of pre-procedural imaging (Gutjahr et al., 2020). Notably, the single case of transcolonic PEG placement reported in the non-CT cohort occurred in the setting

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of failed transillumination, further supporting the importance of proper endoscopic technique rather than routine pre-procedural imaging (Gutjahr et al., 2020). Consistent with these findings, major society guidelines emphasize technique-driven site selection and do not recommend routine cross-sectional imaging in standard PEG placement (Arvanitakis et al., 2021a; Arvanitakis et al., 2021b; Kohli et al., 2025).

Pre-procedural CT should therefore be reserved for selected cases with suspected complex anatomy, prior abdominal surgery, or failed transillumination, where safe access cannot be confirmed endoscopically (Arvanitakis et al., 2021a; Arvanitakis et al., 2021b; Kohli et al., 2025; Gutjahr et al., 2020).

Post-procedurally, CT has a defined role in evaluating suspected complications. It provides rapid assessment of tube position and can identify complications such as malposition, internal bumper migration, perforation, or injury to adjacent viscera (Yasin et al., 2020; Arvanitakis et al., 2021b). Cross-sectional imaging is particularly useful when clinical findings are unclear or when complications are not detectable by endoscopic evaluation alone (Yasin et al., 2020; Arvanitakis et al., 2021b).

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Blunt Abdominal Trauma (AB-10)

Guideline

Blunt Abdominal Trauma (AB-10.1)
References (AB-10)

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Blunt Abdominal Trauma (AB-10.1)

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Criteria

- Abdominal and/or Pelvic ultrasound (CPT® 76700 and/or CPT® 76856) is considered medically necessary for the evaluation of blunt abdominal trauma when requested.
- CT Abdomen and/or Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177) is considered medically necessary for:
  - High probability of intra-abdominal injury after blunt abdominal trauma, with new onset of ANY of the following conditions:
    - Abdominal pain or tenderness
    - Pelvic or femur fracture
    - Lower rib fracture
    - Costal margin tenderness or evidence of thoracic wall trauma
    - Diminished breath sounds
    - Vomiting
    - Pneumothorax
    - Hematocrit less than 30%
    - Hematuria
    - Elevated AST
    - Non-examinable individual (e.g., intoxicated, less than fully conscious, Glasgow Coma Scale Score less than 13, or other condition that precludes a reliable clinical examination)
  - Evidence of abdominal wall trauma or presence of a seat-belt sign
  - If an ultrasound demonstrates definitive abnormalities or yields inconclusive findings

Evidence Discussion

In blunt abdominal trauma, ultrasound is an appropriate initial modality when rapid assessment is needed. It can detect free fluid but lacks sensitivity for solid organ, bowel, and retroperitoneal injuries. A negative or indeterminate study does not exclude clinically significant injury (Gerardo et al., 2024; Smyth et al., 2022).

In hemodynamically stable individuals with high-risk features, contrast-enhanced CT is the preferred modality. CT accurately identifies solid organ injury, hemorrhage, mesenteric disruption, and bowel injury, and is recommended when clinical findings raise concern, including abdominal pain or tenderness, associated fractures, thoracic

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injury, vomiting, abnormal laboratory values, hematuria, or inability to examine the individual (Gerardo et al., 2024; Lee et al., 2026; Costa et al., 2026).

Abdominal wall trauma, particularly a seat belt sign, is strongly associated with intra-abdominal injury and warrants a low threshold for CT imaging. Ultrasound findings that are positive or inconclusive also require CT for definitive evaluation (Pourmand et al., 2024; Smyth et al., 2022; Gerado et al., 2024).

Imaging decisions in blunt abdominal trauma are driven by clinical risk and examination findings rather than the timing of injury. Current guidelines do not support routine CT for all individuals with recent trauma, as a selective approach based on high-risk features maintains diagnostic accuracy while reducing unnecessary radiation and low-yield imaging (Gerardo et al., 2024; Lee et al., 2026). This approach also accounts for variability in presentation, including delayed or evolving intra-abdominal injuries that declare themselves through changes in symptoms rather than a fixed timeframe (De Simone et al., 2024; Smyth et al., 2022).

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Gaucher Disease and Hemochromatosis (AB-11)

Guideline

Gaucher Disease (AB-11.1)
Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases (AB-11.2)
References (AB-11)

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Gaucher Disease (AB-11.1)

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- For evaluation of neurologic involvement in Gaucher Disease, see: **Gaucher Disease (Storage Disorders) (PN-8.6)** in the Peripheral Nerve Disorders (PND) Imaging Guidelines.

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Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases (AB-11.2)

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Criteria

- MRI Abdomen without contrast (CPT® 74181) for iron quantification
  - If transferrin iron saturation (TS) is 45% or greater OR elevated serum ferritin (males [assigned at birth] greater than 300 ng/ml, females [assigned at birth] greater than 200 ng/ml) **AND**
  - Genetic studies for hemochromatosis have been performed and results are ANY of the following:
    - Negative for hemochromatosis
    - C282Y/H63D compound heterozygote
    - C282Y heterozygote
    - Non-C282Y homozygote
- For the evaluation of suspected hepatic iron overload in chronic transfusional states (e.g., sickle cell disease, thalassemia, oncology individuals, bone marrow failure, and stem cell transplant individuals):
  - MRI Abdomen without contrast (CPT® 74181) for iron quantification can be performed annually.
- See: **Transfusion-Associated (Secondary) Hemochromatosis (PEDAB-18.2)** in the Pediatric Abdomen Imaging Guidelines regarding transfusion-associated hepatic iron deposition.
- If clinical, biopsy, or radiological findings suggest advanced fibrosis or cirrhosis and HCC surveillance is requested, then follow HCC Screening Guidelines – See: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)**.
- Role of MR Elastography (CPT® 76391):
  - The role of MR Elastography to assess the degree of fibrosis in the setting of hemochromatosis is not yet clearly defined and thus not currently considered medically necessary.

Background and Supporting Information

Hereditary hemochromatosis is a disorder characterized by excessive iron deposition, which may lead to hepatic injury and fibrosis (European Association for the Study of

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the Liver [EASL], 2022; Girelli et al., 2022). Treatment consists of phlebotomy, with response monitored by serum ferritin levels (EASL, 2022; Kowdley et al., 2019).

In individuals with HFE C282Y/C282Y homozygosity, hepatic iron quantification is generally not required for routine evaluation. Individuals with serum ferritin levels greater than 1,000 µg/L and/or elevated liver enzymes should undergo liver biopsy for fibrosis staging and evaluation of concomitant liver disease. In contrast, individuals with serum ferritin levels less than 1,000 µg/L and normal liver enzymes are generally managed with therapeutic phlebotomy (Kowdley et al., 2019).

Magnetic resonance imaging (MRI) is a noninvasive modality used to estimate hepatic iron concentration (Reeder et al., 2023; Hernando et al., 2023). According to the American College of Gastroenterology (ACG) Clinical Guideline (2019), MRI is appropriate for this purpose in the evaluation of hemochromatosis (Kowdley et al., 2019). Studies suggest that MRI-derived measurements of hepatic iron concentration may be more useful for excluding clinically significant iron overload than for definitively establishing the diagnosis (Kowdley et al., 2019; Reeder et al., 2023). In addition, MRI can help differentiate primary from secondary iron overload by demonstrating characteristic patterns of iron deposition, including involvement of the reticuloendothelial system in secondary forms of iron overload (Kowdley et al., 2019; Reeder et al., 2023). However, when there is a concomitant need to stage hepatic fibrosis, liver biopsy remains the preferred method (Kowdley et al., 2019).

The ACG diagnostic algorithm for the evaluation of hemochromatosis does not include MR elastography at any stage, including assessment of fibrosis severity (Kowdley et al., 2019).

MR elastography may be limited in the setting of significant hepatic iron deposition, as iron-related artifact can degrade signal intensity and reduce diagnostic reliability (Ghoz et al., 2019; Zerunian et al., 2024; Sgier et al., 2024).

Evidence Discussion

Magnetic resonance imaging (MRI) is a validated, noninvasive modality for quantifying hepatic iron concentration, with strong accuracy and reproducibility across imaging platforms (Hernando et al., 2023; Reeder et al., 2023). MRI techniques such as T2 allow for reliable estimation of liver iron burden and can differentiate patterns of iron deposition, supporting distinction between primary and secondary iron overload (Reeder et al., 2023; Elhaie et al., 2025: Kowdley et al., 2019).

Elevated serum ferritin levels are associated with increased risk of advanced fibrosis and cirrhosis in hereditary hemochromatosis. Ferritin levels greater than 1,000 mcg/L are linked to a significantly higher likelihood of cirrhosis, whereas lower levels are associated with minimal risk, supporting their role in risk stratification (EASL, 2022; Girelli et al., 2022); Kowdley et al., 2019.

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Although MRI is effective for iron quantification, its role in serial monitoring during treatment is less clearly defined, and clinical management primarily relies on serum ferritin to guide phlebotomy and assess response (EASL, 2022; Kowdley et al., 2019).

Magnetic resonance elastography (MRE) has reduced reliability in the presence of hepatic iron overload due to signal degradation, which can result in non-diagnostic examinations. Iron overload has been shown to predict elastography failure, and even newer techniques demonstrate decreased feasibility in moderate to severe iron deposition (Ghoz et al., 2019; Sgier et al., 2024; Zerunian et al., 2024).

Computed tomography (CT) is less sensitive for hepatic iron quantification and requires dual-energy techniques while exposing patients to ionizing radiation; therefore, its use is generally limited to cases where MRI is unavailable (Reeder et al., 2023).

In treated hereditary hemochromatosis, total body iron stores may also be estimated through iron removed via serial phlebotomy, which correlates with hepatic iron burden and supports laboratory-based monitoring strategies over repeated imaging (EASL, 2022; Kowdley et al., 2019).

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Hernias (AB-12)

Guideline

Inguinal or Femoral Hernia, or Indeterminate Groin Pain (AB-12.1)
Spigelian, Ventral, Umbilical, or Incisional Hernia (AB-12.2)
Hiatal Hernia (AB-12.3)
References (AB-12)

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Inguinal or Femoral Hernia, or Indeterminate Groin Pain (AB-12.1)

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Criteria

- Clinical examination alone is usually sufficient to confirm the diagnosis of an evident groin hernia.
- If musculoskeletal etiologies such as osteitis pubis or athletic pubalgia are in the differential, see: **Joint Instability and Dysfunction (MS-30.1)** or **Muscle and Tendon Injury (MS-11.1)** in the Musculoskeletal Imaging Guidelines.
- Ultrasound pelvic limited (CPT® 76857) or Ultrasound pelvic complete (CPT® 76856) is the initial imaging study if:
  - vague groin swelling with diagnostic uncertainty OR
  - poor localization of swelling (as might be seen with a small hernia and prominent overlying fat) OR
  - intermittent swelling not present on examination OR
  - other/indeterminate groin complaints without swelling
- If ultrasound is indeterminate or non-diagnostic, ONE of the following is considered medically necessary:
  - CT Pelvis with contrast (CPT® 72193) or CT Pelvis without contrast (CPT® 72192)
  - MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197)
- For suspected incarceration or strangulation (**initial ultrasound is not required**):
  - CT Pelvis with contrast (CPT® 72193) or CT Pelvis without contrast (CPT® 72192)
- For chronic post-surgical groin pain (after hernia repair):
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) or US-guided nerve block
  - CT Pelvis with contrast (CPT® 72193) or CT Pelvis without contrast (CPT® 72192) or MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) can be approved if either ultrasound or ultrasound-guided nerve block is indeterminate or non-diagnostic, to assess for other, non-neuropathic causes.

Evidence Discussion

Diagnosis of inguinal and femoral hernias is primarily clinical, based on history and physical examination. When findings are equivocal or symptoms are nonspecific, ultrasound is the preferred initial imaging modality. It is widely available, lacks ionizing radiation, and allows dynamic assessment with maneuvers such as Valsalva, which

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improve detection of small or intermittently reducible hernias (Shakil et al., 2020; Plumb et al., 2022; Garcia et al., 2022). These dynamic features are not reproducible with CT, which provides a static evaluation (Plumb et al., 2022).

When ultrasound is inconclusive or when there is concern for a complicated hernia, including incarceration or strangulation, cross-sectional imaging is appropriate. CT of the pelvis or MRI can further characterize anatomy, assess for complications, and evaluate alternative diagnoses. Established imaging guidelines support escalation to CT or MRI in these settings but do not support routine abdominal CT for uncomplicated suspected groin hernia (Garcia et al., 2022; Stabilini et al., 2023).

Post-operative groin pain requires a structured approach before advanced imaging. Common causes include neuropathic pain, recurrence, and mesh-related complications (Plumb et al., 2022; Stabilini et al., 2023). Initial evaluation with ultrasound, along with targeted interventions such as nerve block when clinically indicated, can clarify the etiology. Advanced imaging is reserved for cases in which these initial assessments are nondiagnostic or when complications are suspected (Plumb et al., 2022; Stabilini et al., 2023).

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Spigelian, Ventral, Umbilical, or Incisional Hernia (AB-12.2)

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Criteria

- For known or suspected primary or recurrent Spigelian hernia (anterior abdominal wall hernia through the semilunar line), ventral hernia, umbilical, or incisional hernia:
  - CT Abdomen without or with contrast (if hernia is at or above the umbilicus) (CPT® 74150 or CPT® 74160) OR
  - CT Pelvis without or with contrast (if hernia is below the umbilicus) (CPT® 72192 or CPT® 72193) OR
  - CT Abdomen and Pelvis without or with contrast (if hernia is above and below the umbilicus, or indeterminate) (CPT® 74176 or CPT® 74177)

Evidence Discussion

Abdominal wall hernias, including Spigelian, ventral, umbilical, and incisional types, may be difficult to fully characterize on physical examination, particularly in individuals with obesity, prior surgery, or multiple defects. Clinical exam often underestimates defect size, fails to identify occult or secondary hernias, and cannot reliably define the relationship of the hernia to surrounding structures (Garcia et al., 2022; Plumb et al., 2022).

CT provides comprehensive anatomic detail, including precise localization, measurement of defect size, identification of multiple or occult hernias, and characterization of hernia contents. These findings directly inform operative planning, including surgical approach and mesh selection (Garcia et al., 2022). CT imaging should be targeted to the region of concern (Garcia et al., 2022). Imaging of the abdomen or pelvis alone is appropriate when the suspected hernia is anatomically localized above or below the umbilicus, while combined abdomen and pelvis imaging is considered medically necessary when the extent spans regions or is uncertain. This focused approach aligns imaging extent with expected anatomy and avoids unnecessary imaging beyond the clinically relevant area (Garcia et al., 2022).

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Hiatal Hernia (AB-12.3)

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Criteria

- CT Chest with contrast (CPT® 71260) and/or CT Abdomen with contrast (CPT® 74160) is considered medically necessary to evaluate ANY of the following:
  - For pre-operative treatment planning
  - Suspected complication of primary disease or surgery

Background and Supporting Information

- Hiatal hernias occur when a portion of the stomach herniates through the diaphragmatic hiatus into the thoracic cavity. Potential complications include gastric volvulus, obstruction, reflux, and symptoms such as vomiting, chest pain, or dysphagia (Sfara & Dumitrascu, 2019; Daly et al., 2024).

Evidence Discussion

Hiatal hernias are frequently asymptomatic but may present with a range of symptoms depending on size and type, including gastroesophageal reflux, dysphagia, chest pain, or respiratory complaints (Sfara & Dumitrascu, 2019). Clinical evaluation is typically guided by the presenting symptom complex, with targeted diagnostic testing recommended based on suspected complications (Sfara & Dumitrascu, 2019; Daly et al., 2024).

Current surgical society guidelines emphasize that advanced imaging should not be used routinely in the evaluation of uncomplicated hiatal hernia. Rather, imaging is generally reserved for individuals with suspected complications (e.g., volvulus, obstruction) or for preoperative planning in individuals being considered for surgical intervention (Daly et al., 2024; Markar et al., 2023). This approach reflects an effort to minimize unnecessary testing and reduce radiation exposure, particularly when imaging findings are unlikely to alter management.

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Abdominal Mass (AB-13)

Guideline

Abdominal Wall Mass (AB-13.1)
Indeterminate Intra-Abdominal Mass (AB-13.2)
Abnormal Findings on Endoscopy/Colonoscopy (AB-13.3)
References (AB-13)

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Abdominal Wall Mass (AB-13.1)

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Criteria

- Abdominal ultrasound and/or Pelvic ultrasound (CPT® 76700 or CPT® 76705 and/or CPT® 76856) is considered medically necessary as the initial imaging study to assess an abdominal wall or subcutaneous mass.
- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) is considered medically necessary to further characterize a suspected malignant or indeterminate mass detected on ultrasound.
  - Pelvic imaging may be considered medically necessary depending on the anatomic location and extent of the mass.

For individuals with an abdominal wall mass and clinical suspicion for endometriosis, also refer to **Suspected Endometriosis (PV-6.1)**.

Evidence Discussion

Most abdominal wall and subcutaneous masses are benign and often diagnosed clinically. When imaging is required, ultrasound is the preferred initial modality due to its ability to distinguish cystic from solid lesions and assess vascularity with high specificity (Fowler et al., 2019).

Indeterminate or suspicious findings on ultrasound warrant further evaluation with contrast-enhanced CT or MRI. CT provides rapid assessment of lesion size and extent, while MRI offers superior soft tissue characterization when malignancy is suspected. Additional noncontrast CT imaging adds little diagnostic value (Fowler et al., 2019).

Imaging should be limited to the involved anatomic region, with pelvic imaging included when the mass extends beyond the abdominal wall. This stepwise approach supports ultrasound first, followed by targeted advanced imaging when clinically indicated (Fowler et al., 2019).

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Indeterminate Intra-Abdominal Mass (AB-13.2)

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Criteria

- For a palpable abdominal mass on physical examination:
  - Abdominal ultrasound (CPT® 76700) and/or Pelvic ultrasound (CPT® 76856) is considered medically necessary in lieu of CT, if requested
  - CT Abdomen with contrast (CPT® 74160) if above the umbilicus
  - CT Abdomen and Pelvis with contrast (CPT® 74177) if extending below the umbilicus
  - CT Pelvis with contrast (CPT® 72193) if involving the pelvis
- Indeterminate findings on a prior CT or ultrasound:
  - MRI Abdomen without and with contrast (CPT® 74183)
    - MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary to evaluate if the mass extends below the umbilicus or involves the pelvis
- For a pulsatile abdominal mass, suspected aortic aneurysm: See: **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines.
- For females (assigned at birth) with a suspected adnexal mass or fibroid: See: **Adnexal Mass/Ovarian Cysts (PV-5)** or **Leiomyomata/Uterine Fibroids and Other Uterine Masses (PV-12)** in the Pelvis Imaging Guidelines.
- Pregnant individual:
  - Abdominal and/or Pelvic and/or Transvaginal ultrasound (CPT® 76700 and/or CPT® 76856 and/or CPT® 76830) is appropriate for initial imaging.

Evidence Discussion

The origin and characteristics of a palpable intra-abdominal mass are often not reliably defined on physical examination. Ultrasound and contrast-enhanced CT both demonstrate diagnostic utility in this setting. Ultrasound is a reasonable initial modality due to its lack of ionizing radiation, accessibility, and ability to guide selection of subsequent imaging, although its performance may be limited by body habitus and bowel gas (Fowler et al., 2019).

Contrast-enhanced CT provides comprehensive evaluation and has high diagnostic accuracy for confirming or excluding a mass and determining its organ of origin.

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Reported performance includes positive predictive value of 99% and negative predictive value of 97%, with correct identification of organ origin in most cases (Fowler et al., 2019).

MRI is reserved for further characterization of indeterminate findings on ultrasound or CT, offering superior soft tissue differentiation and improved assessment of lesion composition and extent. This stepwise approach supports ultrasound for initial assessment, CT for definitive evaluation, and MRI for problem-solving when needed (Fowler et al., 2019).

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Abnormal Findings on Endoscopy/ Colonoscopy (AB-13.3)

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Criteria

The following criteria applies to findings on endoscopy or colonoscopy that have NOT been diagnosed or biopsy-proven as malignant. For biopsy-proven malignancy, refer to the appropriate Oncology Imaging Guideline.

- For suspicious (not clearly benign) submucosal lesion(s) noted in the stomach or small bowel (including the duodenum), or for gastric extrinsic compression identified on endoscopy, ONE of the following is considered medically necessary:
  - CT Abdomen with contrast (CPT® 74160) OR
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- For suspicious (not clearly benign) lesion(s) noted above the rectum (in the colon or small bowel), unexplained colonic extrinsic compression on colonoscopy, or pre-operative planning for complete surgical removal of a polypoid lesion the following are considered medically necessary:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - MRI Pelvis without and with contrast (CPT® 72197) or MRI Pelvis without contrast (CPT® 72195) is considered medically necessary in addition to CT when there is an additional suspicious lesion(s) in the distal sigmoid or rectum
- For submucosal rectal lesions or unexplained extrinsic compression in the rectum:
  - MRI Pelvis without and with contrast (CPT® 72197), or if requested, MRI Pelvis without contrast (CPT® 72195)
- For endoscopic findings suspicious for malignancy (e.g., friable, necrotic, or partially obstructing mass, or an endoscopic appearance described as consistent with malignancy), the following cross-sectional imaging for staging and assessment is considered medically necessary prior to histologic confirmation:
  - CT Chest with contrast (CPT® 71260)
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- For criteria specific to biopsy-proven colorectal cancer, See **Colorectal Cancer – Initial Work-up/Staging (ONC-16.2)** in the Oncology Imaging Guidelines.
- For criteria specific to biopsy-proven Gastrointestinal Stromal Tumor (GIST): See **Gastrointestinal Stromal Tumor (GIST) (ONC-12.5)** in the Oncology Imaging Guidelines.
- For criteria specific to biopsy-proven gastric cancer: See **Gastric Cancer - Initial Work-up/Staging (ONC-14.9)** in the Oncology Imaging Guidelines.

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Evidence Discussion

Endoscopic ultrasound (EUS), with or without fine-needle aspiration, is the preferred initial modality for characterization of submucosal lesions of the stomach and rectum identified on endoscopy. EUS provides high-resolution assessment of bowel wall layers, allowing determination of lesion origin, depth, and features suggestive of malignancy, which cannot be reliably established with cross-sectional imaging alone (Jacobson & Shami, 2024; Sharzehi et al., 2022).

When lesions are indeterminate, suspicious, or associated with extrinsic compression, cross-sectional imaging is indicated to evaluate extent and identify extraintestinal disease. Contrast-enhanced CT of the abdomen and pelvis provides rapid and accurate assessment of the gastrointestinal tract and surrounding structures, including detection of lymphadenopathy, metastatic disease, and involvement beyond the bowel wall. CT is therefore appropriate for lesions in the stomach, small bowel, or colon when further characterization or preoperative planning is required (Fowler et al., 2019; Benson et al., 2025a, 2025b).

For rectal or distal sigmoid lesions, MRI of the pelvis with or without contrast is preferred for local staging due to its superior soft tissue resolution and ability to define involvement of the rectal wall, mesorectal fascia, and adjacent structures. This added detail is necessary for surgical planning and risk stratification in distal lesions (Benson et al., 2025b; Maccioni et al., 2023).

When endoscopic findings are highly suggestive of malignancy, cross-sectional imaging for staging is appropriate prior to histologic confirmation. CT of the chest, abdomen, and pelvis with contrast is recommended to evaluate for distant metastatic disease and guide management (Benson et al., 2025a, 2025b; National Comprehensive Cancer Network, 2026).

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Lower Extremity Edema (AB-14)

Guideline

Lower Extremity Edema (AB-14)

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Lower Extremity Edema (AB-14)

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In the setting of inferior vena cava (IVC) thrombus secondary to the filter or concern for proximal deep vein thrombosis (DVT) (iliofemoral), see: **Acute Limb Swelling (PVD-12)** and for evaluation of chronic limb swelling/May-Thurner Syndrome, see: **Chronic Limb Swelling Due to Venous Insufficiency/Venous Stasis Changes/Varicose Veins (PVD-13)** in the Peripheral Vascular Disease Imaging Guidelines.

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Zollinger-Ellison Syndrome (ZES-Gastrinoma) (AB-15)

Guideline

Zollinger-Ellison Syndrome (ZES-Gastrinoma) (AB-15.1)

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Zollinger-Ellison Syndrome (ZES-Gastrinoma) (AB-15.1)

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- For suspected gastrinoma, see: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines.

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Adrenal Cortical Lesions (AB-16)

Guideline

Adrenal Cortical Lesions (AB-16)
Asymptomatic Adrenal Cortical Lesions (AB-16.1)
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Adrenal Hormone Excess/Symptomatic Adrenal Lesions (AB-16.2)
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Adrenal Insufficiency (AB-16.3)
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Adrenal Nuclear Imaging (AB-16.4)
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Adrenal Cortical Lesions (AB-16)

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Code	Description
74150	CT Abdomen without contrast
74160	CT Abdomen with contrast
74170	CT Abdomen without and with contrast
74181	MRI Abdomen without contrast
74183	MRI Abdomen without and with contrast
78812	PET, Skull Base to Mid-Thigh
78815	PET/CT, Skull Base to Mid-Thigh

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Asymptomatic Adrenal Cortical Lesions (AB-16.1)

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Criteria

- The following recommendations are for asymptomatic individuals:
  - For symptomatic individuals, see: **Symptomatic Adrenal Cortical Lesions (AB-16.2)**.
  - US is not a prerequisite study for advanced imaging in the evaluation of any adrenal abnormality.
- Abdominal pain may be present in large or rapidly expanding adrenal tumors due to mass effect or hemorrhage.
  - If the source of abdominal pain is suspected to be an incidental adrenal mass and initial imaging was indeterminate, immediate reimaging with a dedicated adrenal protocol study (see 3 imaging modalities below) is reasonable irrespective of the size of the mass.
  - See: **Abdominal Pain (AB-2)** in the Abdomen Imaging Guidelines for imaging recommendations if abdominal pain is unrelated to the adrenal mass.
- The three imaging modalities that can be used for definitive benign characterization of an adrenal mass are:
  - CT Abdomen without contrast (CPT® 74150)
  - CT Abdomen without and with contrast (CPT® 74170)
  - CS-MRI (chemical shift MRI, CPT® 74181)
- The following list represents definitively benign characteristics of the adrenal gland. This list applies wherever "benign characteristics" are mentioned in the table below:
  - 10 Hounsfield units (HFU) or less on computed tomography (CT)
  - Absolute washout of 60% or greater or relative washout of 40% or greater on CT abdomen without and with contrast using calculated washout (adrenal protocol CT, CPT® 74170)
    - An important exception to the washout rule: Non-adenomatous adrenal masses that may show elevated washout on adrenal protocol CT but are not benign include:
      - adrenal metastasis from hypervascular tumors (e.g. RCC and HCC)
      - pheochromocytoma
      - adrenocortical carcinoma

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        - clinical suspicion should be used in these cases to guide further investigation
    - Decreased signal on Chemical Shift MRI (CS-MRI, CPT® 74181)
    - Cyst, if imaging was completed without and with contrast and demonstrated no enhancement, defined as a change of less than 10 HFU between the unenhanced and contrast-enhanced CT images.
    - Adrenal myelolipoma (macroscopic fat)
- If a definitive benign diagnosis cannot be made during follow-up imaging using a dedicated CT adrenal protocol (If less than 60% absolute washout or less than 40% relative washout) or lack of signal drop out on MRI chemical shift:
    - Additional imaging is considered medically necessary at 6-12 months from initial follow up, OR
    - Consider resection for possible primary adrenocortical carcinoma after biochemical evaluation and exclusion of pheochromocytoma.
        - For individuals who are poor surgical candidates, if ordered by or in consultation with an endocrinologist, endocrine surgeon, or urologist:
            - Imaging as requested
- CT Abdomen without and with contrast (CPT® 74170) may be considered medically necessary in place of any below recommended CT Abdomen without contrast for the following:
    - Facility protocol is to cease imaging if adrenal mass is found to have an attenuation value of less than 10 HFU on initial non-contrasted images
- MRI Abdomen without contrast (CPT® 74181) is considered medically necessary in place of CT for the following:
    - Clips that cause artifacts when using CT
    - Allergy to CT contrast
    - Individuals in whom radiation exposure should be limited (children, pregnant individuals, individuals with known germline mutations, and individuals with recent excessive radiation exposure)
- CS MRI may not detect the intracellular lipid in an adrenal mass if HFU is 30 HU or more on CT without contrast. CS MRI is less effective than CT without and with contrast with calculated washout for adenomas with unenhanced attenuation of more than 20 HU
- Below imaging can be applied to bilateral adrenal masses, with each lesion addressed separately.

Mass Characteristics and Appropriate Imaging

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Mass Details	Imaging Study
• Asymptomatic AND • Incidentally found on US, CT, or MRI of area OTHER than the abdomen or if seen only on US of the abdomen AND • Any size AND • No history of cancer	• CT Abdomen without contrast (CPT® 74150)
• Asymptomatic AND • Incidentally found on CT Chest without contrast, entirely imaged, and fully characterized as indeterminate by HFU score AND • greater than 2 cm AND • No history of cancer	• CT Abdomen without and with contrast (CPT® 74170) in lieu of above recommended CT Abdomen without contrast (CPT® 74150)
• Asymptomatic AND • Incidentally found on CT or MRI of the Abdomen or Abdomen and Pelvis AND • less than 1 cm in short axis AND • No history of cancer	• No further imaging is considered medically necessary ◦ It is uncertain as to whether subcentimeter nodularity or adrenal thickening qualifies as an adrenal mass on radiology reports
• Asymptomatic AND • Incidentally found on CT or MRI of the Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • Diagnostic with benign imaging characteristics AND • 1 cm or greater AND • No history of cancer	• No further imaging is considered medically necessary, regardless of size ◦ The risk of malignancy in a mass with diagnostically benign findings on imaging is extremely low

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Mass Details	Imaging Study
• Asymptomatic AND • 1 cm to 2 cm AND • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • No history of cancer	• Reimaging is considered medically necessary at 12 months from the initial indeterminate study, as follows*: ◦ CT Abdomen without and with contrast (CPT® 74170 - adrenal protocol), CT Abdomen without contrast (CPT® 74150), or CS-MRI (chemical shift MRI, CPT® 74181) ▪ No further imaging is considered medically necessary after initial 12 month study if ANY of the following: - Definitively benign characteristics - Stable in size (change of less than 8mm) over a period greater than 1 year (likely benign adenoma) *NOTE: These instructions are regarding indeterminate lesions without prior studies to compare, in asymptomatic individuals. If prior imaging exists for comparison and radiology report shows stability over 1 year or if the imaging study already shows definitively benign characteristics, no further imaging is medically necessary

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Mass Details	Imaging Study
• Asymptomatic AND • Greater than 2 cm to less than 4 cm AND • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • No history of cancer	• Reimaging is considered medically necessary immediately after initial indeterminate study, as follows*: ◦ CT Abdomen without and with contrast (CPT® 74170 - adrenal protocol), or CS-MRI (chemical shift MRI, CPT® 74181) ▪ Further follow-up imaging is considered medically necessary at 6 and 12 months ▪ No further imaging is considered medically necessary if the initial study or follow up study has definitively benign characteristics or if follow up study shows stability in size (change of less than 8mm) over a period greater than 1 year (as likely benign adenoma) *NOTE: These instructions are regarding indeterminate lesions without prior studies to compare, in asymptomatic individuals. If prior imaging exists for comparison and radiology report shows stability over 1 year or if the imaging study already shows definitively benign characteristics no further imaging is medically necessary.
• Asymptomatic AND • 4 cm or greater AND • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • No history of cancer	• Reimaging is considered medically necessary immediately after initial indeterminate study, as follows: ◦ CT Abdomen without and with contrast (CPT® 74170) or chemical shift MRI (CPT® 74181) • Consider resection for possible primary adrenocortical carcinoma ◦ See: **Adrenocortical Carcinoma (ONC-15.13)** in the Oncology Imaging Guidelines

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Mass Details	Imaging Study
• History of cancer with a likelihood or propensity to metastasize to the adrenal gland or abdomen • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis	• See: **Adrenal Gland Metastases (ONC-31.4)** in the Oncology Imaging Guidelines
• Known adrenal mass with benign characteristics, but newly symptomatic or new hormonal excess	• Repeat imaging per **Adrenal Hormone Excess/Symptomatic Adrenal Lesions (AB-16.2)**

Background and Supporting Information

Adrenal incidentalomas are adrenal masses discovered during imaging performed for reasons unrelated to suspected adrenal disease. Current endocrine society guidelines recommend biochemical evaluation of most adrenal incidentalomas to assess for hormone excess, with the exception of lesions demonstrating imaging characteristics diagnostic of myelolipoma or simple cysts. However, laboratory evaluation is not required solely to obtain imaging in an asymptomatic individual with an incidentally detected adrenal lesion (Fassnacht et al., 2023).

Approximately 75% of adrenal incidentalomas are benign adenomas. Lipid-rich adenomas typically demonstrate attenuation values of 10 Hounsfield units (HU) or less on unenhanced CT and can often be characterized as benign without additional imaging. Lesions that do not meet these criteria may require further characterization using dedicated adrenal CT washout protocols or chemical-shift magnetic resonance imaging (MRI) (Mody et al., 2021; Fassnacht et al., 2023; Kebebew, 2021).

Adrenal masses are frequently identified on contrast-enhanced CT examinations performed for unrelated abdominal indications. When an adrenal lesion is identified on a contrast-enhanced study alone, characterization may be limited because unenhanced attenuation values and contrast washout characteristics are unavailable. Dedicated adrenal imaging protocols can provide additional characterization of indeterminate lesions (Mody et al., 2021; Fassnacht et al., 2023).

An adrenal protocol CT includes assessment of lesion attenuation on unenhanced imaging and evaluation of contrast washout on delayed imaging. Chemical-shift MRI can also be used to assess for intracellular lipid content and may be considered when CT is contraindicated or when iodinated contrast administration is not appropriate (Mody et al., 2021; Fassnacht et al., 2023).

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Imaging features associated with benign adrenal lesions include smooth margins, homogeneous appearance, absence of calcification, hemorrhage, or necrosis, lack of fluorodeoxyglucose (FDG) avidity on positron emission tomography (PET), and lesion stability over time. Imaging features associated with malignancy include irregular margins, heterogeneous appearance, calcification, hemorrhage, necrosis, FDG avidity, interval growth, and larger lesion size (Fassnacht et al., 2023; Kebebew, 2021; Kiseljak-Vassiliades et al., 2020).

The adrenal glands are a common site of metastatic disease. Primary malignancies most frequently associated with adrenal metastases include lung cancer, melanoma, renal cell carcinoma, and gastrointestinal malignancies (Kebebew, 2021; Kiseljak-Vassiliades et al., 2020).

Benign Adenoma Imaging Characteristics		
Imaging Study:	Findings consistent with Adenoma:	Indeterminate for Adenoma:
CT Abdomen without contrast	10 Hounsfield Units or less	Greater than 10 Hounsfield Units
CT Abdomen without and with contrast, including calculated washout	Absolute washout of 60% or greater or relative washout of 40% or greater	Absolute washout of less than 60% and relative washout of less than 40%
Chemical Shift MRI	Signal drop out	Lack of signal drop out

Evidence Discussion

CT abdomen is the preferred initial imaging modality for evaluation of adrenal masses because it provides accurate lesion characterization, is widely available, and permits assessment of attenuation characteristics and contrast washout patterns. Most adrenal incidentalomas are benign adenomas, many of which are lipid-rich and demonstrate attenuation values of 10 HU or less on unenhanced CT. Using this threshold, unenhanced CT demonstrates high specificity for adenoma characterization (Corwin & Remer, 2021; Mody et al., 2021; Fassnacht et al., 2023).

For lesions that do not meet diagnostic benign imaging criteria, adrenal protocol CT allows calculation of absolute and relative contrast washout, improving differentiation between adenomas and non-adenomas. Studies support adrenal washout CT as an effective method for characterizing indeterminate adrenal lesions, with reported sensitivity approaching 98% and specificity approximately 92% (Mody et al., 2021; Grajewski & Caoili, 2021).

Chemical-shift MRI is an accepted alternative when CT or iodinated contrast is contraindicated. MRI can identify intracellular lipid and assist in characterization of

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lipid-poor adenomas; however, its diagnostic performance decreases in lesions with higher attenuation values, where CT washout analysis may provide greater diagnostic confidence (Mody et al., 2021; Grajewski & Caoili, 2021).

Current endocrine and radiology guidelines support additional imaging evaluation for indeterminate adrenal lesions because the differential diagnosis includes pheochromocytoma, adrenocortical carcinoma, metastatic disease, and other clinically significant pathologies. Conversely, lesions demonstrating established benign imaging features generally do not require further characterization (Fassnacht et al., 2023; Mody et al., 2021; Kebebew, 2021).

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Adrenal Hormone Excess/Symptomatic Adrenal Lesions (AB-16.2)

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Criteria

- Prior to advanced imaging, adrenal hormone excess must be clinically suspected and then biochemically confirmed via testing listed in the table below.
- The following imaging recommendations can also be followed in asymptomatic individuals with an adrenal incidentaloma who are found to have abnormalities at initial hormonal evaluation.
- For severe hormone elevation or rapidly progressing symptoms for which adrenocortical carcinoma is suspected, see: **Adrenocortical Carcinoma (ONC-15.13)** in the Oncology Imaging Guidelines.

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR to initial adrenal imaging	Indicated Imaging
• Suspected cortisol excess (adrenal Cushing's Syndrome)	• Weight gain • Hyperglycemia/ diabetes • Low bone mineral density/fractures • Hyperpigmented Striae • Lipodystrophy ("buffalo hump")	• adrenocorticotropic hormone (ACTH) low/suppressed AND • Cortisol elevation documented by any of the following: ◦ Elevated morning cortisol following overnight 1mg dexamethasone suppression (cortisol greater than 1.8 mcg/dL) ◦ Elevated late night salivary cortisol ◦ Elevated urine free cortisol	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate adrenal mass, the following is considered medically necessary immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181)

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR to initial adrenal imaging	Indicated Imaging
• Suspected adrenal hyper-androgenism/ virilizing adrenal tumor	• Hirsutism • Virilization (voice deepening, clitoromegaly)	• Elevated serum dehydroepi-androsterone sulfate (DHEAS) AND/OR • Elevated testosterone	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate mass, the following is considered medically necessary immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181) • In individuals with an elevated testosterone level and an ovarian etiology is suspected, see: **Polyendocrine Metabolic Ovarian Syndrome (PMOS) (PV-8.1)** in the Pelvis Imaging Guidelines and **Ovarian Cancer-**

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR to initial adrenal imaging	Indicated Imaging
			Suspected/ Diagnosis (ONC-21.2) in the Oncology Imaging Guidelines.
• Suspected feminizing adrenal tumor	• Gynecomastia • Testicular atrophy	• Elevated serum estradiol AND • Non-elevated serum luteinizing hormone (LH) AND • No testicular mass seen on dedicated imaging	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate adrenal mass, the following is considered medically necessary immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181)

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR to initial adrenal imaging	Indicated Imaging
• Suspected primary aldosteronism (Conn's Syndrome)	• HTN • Hypokalemia	• Serum aldosterone level of 10 ng/dL or greater in the setting of suppressed renin and spontaneous hypokalemia (Serum potassium level less than 3.5mEq/L) OR • Confirmatory testing showing lack of aldosterone suppression.	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate adrenal mass, the following is considered medically necessary immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181)

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR to initial adrenal imaging	Indicated Imaging
• Suspected pheo-chromocytoma/ paraganglioma	• HTN • Palpitations • Tremor • Pallor • Flushing • Hyperadrenergic spells	• Elevated plasma free metanephrines OR • Elevated urinary fractionated metanephrines	• CT Abdomen and Pelvis without and with contrast (CPT® 74178), CT Abdomen and Pelvis with contrast (CPT® 74177), or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast • See also: **Adrenal Nuclear Imaging (AB-16.4)** and **Adrenal Tumors (ONC-15.10)** in the Oncology Imaging Guidelines and **Hereditary Paraganglioma-Pheochromocytoma Syndromes (PEDONC-2.13)** in the Pediatric and Special Populations Oncology Imaging Guidelines
• Suspected adrenocortical carcinoma	• Rapidly progressive symptoms • Elevation of multiple adrenal hormones	• N/A	• See: **Adrenocortical Carcinoma (ONC-15.13)** in the Oncology Imaging Guidelines

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR to initial adrenal imaging	Indicated Imaging
• Confirmed adrenal hormone excess AND • Requested for surgical planning AND • Requested by or in consultation with an endocrinolo-gist, endocrine surgeon, or urologist	N/A	N/A	• Repeat imaging as requested

Background and Supporting Information

- Functional adrenal tumors may present with excess production of cortisol, aldosterone, adrenal androgens, estrogens, or catecholamines. Surgical resection is generally the preferred treatment for virilizing adrenal tumors, feminizing adrenal tumors, pheochromocytoma/paraganglioma (PPGL), and suspected adrenocortical carcinoma because of the potential for malignancy and associated morbidity. Adrenal tumors causing autonomous cortisol secretion or primary aldosteronism may also be managed surgically when unilateral disease is identified (Adler et al., 2025; Fassnacht et al., 2023; Shah et al., 2021).

Suspected cortisol excess (Adrenal Cushing's syndrome)

- Adrenal Cushing's syndrome results from autonomous cortisol production by an adrenal adenoma or carcinoma. Suppressed or low adrenocorticotropic hormone (ACTH) levels are consistent with an adrenal source of cortisol excess. Clinical manifestations may develop gradually and diagnosis is frequently delayed because

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signs and symptoms often evolve over several years (Fleseriu et al., 2021; Fassnacht et al., 2023)

Suspected adrenal hyperandrogenism/virilizing adrenal tumor

- Testosterone is produced by both the ovary (primary source) and adrenal gland while DHEA and DHEAS are produced almost exclusively by the adrenal gland (Kanakis et al., 2019; Shah et al., 2021).
- The magnitude of androgen elevation has limited predictive value for identifying tumors; however, markedly elevated testosterone levels within the adult male reference range or a dehydroepiandrosterone sulfate (DHEAS) level greater than 700 mcg/dL may be suggestive of a tumor (Kanakis et al., 2019; Shah et al., 2021).

Suspected feminizing adrenal tumor

- Adrenal tumors, mainly carcinomas (extremely rare, 0.5–2.0 per million), can secrete both estrogens and high amounts of adrenal androgens, which aromatize to estrogens. In this case, gynecomastia is usually of recent onset, progresses rapidly and testicular atrophy can also be seen. (Kanakis et al., 2019; Kiseljak-Vassiliades et al., 2020)
- Common causes of excessive endogenous estrogens should be excluded prior to adrenal imaging. These include increased secretion from testis (Leydig cell or Sertoli cell tumors, stimulation of normal Leydig cells by LH or hCG) and increased aromatization of androgens to estrogens (aging, obesity, alcoholic cirrhosis, hyperthyroidism, drugs, hCG-secreting tumors, aromatase excess syndrome). (Kanakis et al., 2019; Kiseljak-Vassiliades et al., 2020)

Suspected primary aldosteronism (Conn's syndrome)

- A positive screen for primary aldosteronism is an aldosterone level of 10 ng/dL or greater in the setting of suppressed renin and spontaneous hypokalemia. Suppressed renin is defined as a plasma renin activity of 1 ng/mL/hour or less or a plasma renin concentration less than 5 to 8.2 mU/L. Spontaneous hypokalemia is defined as a serum potassium level less than 3.5 mEq/L (Adler et al., 2025; Hundemer & Vaidya, 2019).
- The most common dynamic confirmatory tests include the oral sodium suppression test, the seated intravenous saline suppression test, the fludrocortisone suppression test, and the captopril challenge test, and results that indicate a "positive" result are unique to the each test. For example, if oral sodium loading is used, a 24-hour urine aldosterone excretion of more than 12 mcg in the setting of 24-hour urine sodium excretion of more than 200 mEq is diagnostic of primary aldosteronism (and values of more than 10 mcg/24 hours are strongly suggestive) (Adler et al., 2025; Hundemer & Vaidya, 2019).
- Primary hyperaldosteronism may be managed medically with mineralocorticoid receptor antagonists (spironolactone and eplerenone) in cases of bilateral adrenal

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disease or poor surgical candidacy. If there has been no recent adrenal imaging, reimaging can be considered in cases of diagnostic uncertainty or poor response to medical therapy (Adler et al., 2025; Hundemer & Vaidya, 2019).

Suspected pheochromocytoma/paraganglioma

- A pheochromocytoma (85% of chromaffin tumors) arises from the chromaffin cells in the adrenal medulla and commonly produces one or more of the following catecholamines: epinephrine, norepinephrine and dopamine(Taïeb et al., 2019; NCCN, 2025).
- A paraganglioma (15-20% of chromaffin tumors) arises from the extra-adrenal chromaffin cells of the sympathetic paravertebral ganglia of the thorax, abdomen, and pelvis (catecholamine producing) or the parasympathetic ganglia along the glossopharyngeal and vagal nerves in the neck and base of skull (not catecholamine producing)(Taïeb et al., 2019; NCCN, 2025).
- Cases of pheochromocytoma/paraganglioma can be sporadic but one-third are hereditary and due to germ-line mutations that may increase malignant potential (Taïeb et al., 2019; NCCN, 2025)

Suspected adrenocortical carcinoma

- Adrenocortical carcinoma may be suspected radiographically or clinically. Approximately 60% of individuals present with evidence of adrenal steroid hormone excess, with or without virilization. Hormonally inactive ACCs typically produce symptoms related to tumor burden, including abdominal pain, back pain, early satiety, and weight loss (Fassnacht et al., 2023; Shah et al., 2021).

Evidence Discussion

Current endocrine and oncology guidelines recommend cross-sectional imaging after biochemical evidence demonstrates adrenal hormone excess to localize the adrenal source, characterize adrenal lesions, and guide treatment planning (Adler et al., 2025; Fassnacht et al., 2023; Vaidya et al., 2019).

CT abdomen is generally the preferred initial imaging modality because it provides high spatial resolution and allows characterization of adrenal lesions based on size, attenuation, enhancement, and washout characteristics. These imaging features help distinguish benign adenomas from lesions requiring further evaluation, including pheochromocytoma, adrenocortical carcinoma, and metastatic disease (Fassnacht et al., 2023; Vaidya et al., 2019).

MRI with chemical-shift imaging serves as an important alternative when iodinated contrast administration is contraindicated or when additional lesion characterization is required. MRI can identify intracellular lipid and assist in differentiating benign adenomas from non-adenomatous lesions (Vaidya et al., 2019; Fassnacht et al., 2023).

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For suspected pheochromocytoma or paraganglioma, imaging of both the abdomen and pelvis may be necessary because paragangliomas arise from extra-adrenal paraganglionic tissue and may occur throughout the sympathetic chain, including the abdomen and pelvis. Comprehensive imaging also contributes to staging and treatment planning (Taïeb et al., 2019; NCCN, 2025).

When adrenocortical carcinoma is suspected, cross-sectional imaging is essential for characterization of the primary lesion, assessment of local invasion, and evaluation for metastatic disease. Imaging findings directly influence surgical planning and staging (Shah et al., 2021; Fassnacht et al., 2023; Kiseljak-Vassiliades et al., 2020).

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Adrenal Insufficiency (AB-16.3)

AB.AC.0016.3.A
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Criteria

- Biochemical confirmation of primary adrenal insufficiency is required prior to imaging and may be established by either:
  - Low morning cortisol with elevated ACTH, or
  - An abnormal/suboptimal corticotropin stimulation test.
- CT Abdomen (contrast as requested) is considered medically necessary if the cause of primary adrenal insufficiency is unclear.
  - MRI Abdomen (contrast as requested) is considered medically necessary if CT is contraindicated.
- Imaging is considered NOT medically necessary if clinical presentation and labs are consistent with ANY of the following:
  - Primary autoimmune destruction of the adrenal cortex (Addison's disease)
  - Congenital adrenal hyperplasia
  - Adrenoleukodystrophy

Evidence Discussion

Primary adrenal insufficiency should be established by biochemical testing before imaging is performed. Current endocrine guidelines recommend diagnosis based on laboratory evidence of adrenal failure, including a low morning cortisol level with elevated adrenocorticotropic hormone (ACTH) and/or an abnormal corticotropin stimulation test. Imaging is not intended to establish the diagnosis of primary adrenal insufficiency but rather to evaluate its underlying cause when the etiology remains uncertain (Bornstein et al., 2016; Charoensri & Auchus, 2024).

Computed tomography (CT) of the abdomen is the preferred initial imaging modality when evaluation of a structural cause of primary adrenal insufficiency is indicated. CT provides detailed assessment of adrenal gland morphology and can identify adrenal enlargement, calcification, hemorrhage, infiltrative processes, infection, primary adrenal tumors, and metastatic disease that may contribute to adrenal dysfunction (Bornstein et al., 2016; Hahner et al., 2021).

Imaging is most useful when the etiology of primary adrenal insufficiency remains unclear after clinical and laboratory evaluation. Potential causes identifiable on imaging include adrenal hemorrhage, tuberculosis and other infections, infiltrative disorders, primary adrenal malignancies, and metastatic disease. CT can detect characteristic morphologic findings that may help establish these diagnoses and guide further

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management (Abreu-Gomez et al., 2025; Badawy et al., 2021; Elhassan et al., 2023; Hahner et al., 2021).

Conversely, imaging is generally not indicated when clinical and laboratory findings establish a known autoimmune or genetic cause of primary adrenal insufficiency, such as autoimmune adrenalitis (Addison disease), congenital adrenal hyperplasia, or adrenoleukodystrophy, because imaging findings are unlikely to alter diagnosis or management in these conditions (Bornstein et al., 2016; Hahner et al., 2021).

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Adrenal Nuclear Imaging (AB-16.4)

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Criteria

Nuclear medicine imaging can assist in the evaluation of adrenal masses not adequately characterized by CT or MRI.

- Evaluation of SUSPECTED pheochromocytoma or paraganglioma:
  - MIBG (Any ONE of the following codes can be considered medically necessary: CPT® 78801, CPT® 78802, or CPT® 78804).
    - Any ONE of the following codes may also be considered medically necessary, individual or in combination with CPT® 78801, 78802, 78804: SPECT studies (CPT® 78803 or CPT® 78831), or hybrid SPECT/CT studies (CPT® 78830 or CPT® 78832).
  - Octreotide scans can be considered medically necessary in place of MIBG scans (with the same CPT codes) as requested in rare clinical circumstances including head and neck paragangliomas.
- For PET/CT indications and for cases of KNOWN pheochromocytoma or paraganglioma, see: **Adrenal Tumors (ONC-15.10-15.12)** in the Oncology Imaging Guidelines.
- Evaluation of SUSPECTED neuroblastoma, ganglioneuroblastoma, or ganglioneuromas:
  - MIBG (Any ONE of the following codes can be considered medically necessary: CPT® 78801, CPT® 78802, or CPT® 78804).
    - Any ONE of the following codes may also be considered medically necessary, individual or in combination with CPT® 78801, 78802, 78804: SPECT studies (CPT® 78803 or CPT® 78831), or hybrid SPECT/CT studies (CPT® 78830 or CPT® 78832).
- For KNOWN neuroblastoma, ganglioneuroblastoma, or ganglioneuroma, see **Neuroblastoma (PEDONC-6)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Adrenal Nuclear Imaging of the cortex and/or medulla (single site, planar imaging of the adrenal gland only) (CPT® 78075) includes the adrenal scintigraphy scans for 131 I-iodocholesterol (NP-59) as well as MIBG (Iodine i-123 iobenguane and Iodine i-131 iobenguane sulfate) scans.
  - 131 I-iodocholesterol (NP-59) scans for adrenal cortex imaging can be useful in cases of suspected hyperaldosteronism and adrenal Cushing's, however NP-59 is not readily available for use in the United States.

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  - MIBG (Iodine i-123 iobenguane and Iodine i-131 iobenguane sulfate) scans for adrenal medulla imaging can be helpful in cases of known pheochromocytoma or neuroblastoma.
    - CPT® 78075 is insufficient for the initial evaluation of a suspected pheochromocytoma, paraganglioma or neuroblastoma as this study does not evaluate extra-adrenal sites of disease, but can be considered in rare circumstances.
    - SPECT and SPECT/CT codes as listed above for MIBG can be added to CPT® 78075 as requested.
- History of multiple endocrine neoplasia syndromes: See **Multiple Endocrine Neoplasias (MEN) (PEDONC-2.8)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- History of neurofibromatosis: there is insufficient evidence to support routine imaging of adult individuals with Neurofibromatosis in asymptomatic individuals. See: **Adrenal Hormone Excess/Symptomatic Adrenal Lesions (AB-16.2)** if there is concern for pheochromocytoma. Labs would be required before imaging as stated in guideline.
- History of von Hippel-Lindau disease: See **Von Hippel-Lindau Syndrome (VHL) (PEDONC-2.10)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Evidence Discussion

Nuclear medicine imaging provides functional characterization of adrenal and neuroendocrine tumors and may be useful when adrenal masses are not adequately characterized by CT or MRI. Metaiodobenzylguanidine (MIBG) imaging has established utility in the evaluation of suspected pheochromocytoma and paraganglioma (PPGL), particularly because these tumors may arise in adrenal or extra-adrenal locations (Carrasquillo et al., 2021; Taïeb et al., 2019; Timmers et al., 2024).

Somatostatin receptor imaging may be useful in select clinical circumstances, including head and neck paragangliomas, and can identify additional sites of disease not detected with conventional imaging (Taïeb et al., 2019; Timmers et al., 2024).

MIBG imaging also plays an important role in the evaluation of suspected neuroblastoma, ganglioneuroblastoma, and ganglioneuroma by assisting with lesion localization and disease staging (Carrasquillo et al., 2021).

Single-site adrenal scintigraphy (CPT® 78075) is generally insufficient for the initial evaluation of suspected pheochromocytoma, paraganglioma, or neuroblastic tumors because it does not evaluate extra-adrenal disease. Whole-body planar imaging, SPECT, and SPECT/CT provide more comprehensive assessment and may improve lesion detection and localization (Carrasquillo et al., 2021; Taïeb et al., 2019; Timmers et al., 2024).

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Abdominal Aortic Aneurysm (AAA), Iliac Artery Aneurysm (IAA), and Visceral Artery Aneurysms Follow-Up of Known Aneurysms and Pre-Op Evaluation (AB-17)

Guideline

Abdominal Aortic Aneurysm (AAA) (AB-17.1)
Iliac Artery Aneurysm (IAA) (AB-17.2)
Visceral Artery Aneurysm (AB-17.3)

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Abdominal Aortic Aneurysm (AAA) (AB-17.1)

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- For the evaluation of an abdominal aortic aneurysm or pulsatile abdominal mass, see: **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)** in the Peripheral Vascular Disease Imaging Guidelines.

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Iliac Artery Aneurysm (IAA) (AB-17.2)

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- For the evaluation of iliac artery aneurysm (IAA) see: **Iliac Artery Aneurysm (IAA) (PVD-6.4)** in the Peripheral Vascular Disease Imaging Guidelines.

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Visceral Artery Aneurysm (AB-17.3)

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- For the evaluation of known or suspected visceral artery aneurysm, see: **Visceral Artery Aneurysm (PVD-6.5)** in the Peripheral Vascular Disease Imaging Guidelines.

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Abdominal Aortic Aneurysm (AAA) and Iliac Artery Aneurysm (IAA)-Post Endovascular or Open Aortic Repair (AB-18)

Guideline

AAA, IAA, Post Endovascular or Open Aortic Repair (AB-18.1)

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AAA, IAA, Post Endovascular or Open Aortic Repair (AB-18.1)

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- For open aortic abdominal aneurysm repair and additional imaging indications, see: **Post Aortic Endovascular/Open Surgery Surveillance Studies (PVD-6.8)** in the Peripheral Vascular Disease Imaging Guidelines.

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Aortic Dissection and Imaging for Other Aortic Conditions (AB-19)

Guideline

Aortic Dissection and Other Aortic Conditions (AB-19.1)
Imaging for Other Aortic Conditions (AB-19.2)

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Aortic Dissection and Other Aortic Conditions (AB-19.1)

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- For the evaluation of aortic dissection and other aortic conditions, see: **Aortic Imaging** in the Peripheral Vascular Disease Imaging Guidelines.

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Imaging for Other Aortic Conditions (AB-19.2)

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- For imaging indications for other aortic conditions, see: **Aortic Imaging** in the Peripheral Vascular Disease Imaging Guidelines.

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Bowel Obstruction, Gastroparesis, and Bloating (AB-20)

Guideline

Bowel Obstruction (AB-20.1)
Gastroparesis and Dumping Syndrome (AB-20.2)
Nausea and Vomiting as the Primary Symptom (AB-20.3)
Superior Mesenteric Artery (SMA) Syndrome (AB-20.4)
Bloating, Gas, and Distention (AB-20.5)
References (AB-20)

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Bowel Obstruction (AB-20.1)

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Criteria

- Suspected bowel obstruction:
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary
  - Pediatric individuals:
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary in lieu of CT, if requested.
  - Pregnant individuals:
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195) is considered medically necessary
  - If the etiology or level of suspected intermittent or low-grade small bowel obstruction remains undetermined and additional imaging is needed after CT Abdomen and Pelvis ONE of the following is considered medically necessary:
    - CT Enteroclysis (CPT® 74176 or CPT® 74177) OR
    - CT Enterography (CPT® 74177) OR
    - MR Enteroclysis (CPT® 74183 and CPT® 72197) OR
    - MR Enterography (CPT® 74183 and CPT® 72197)
- CT Enterography (CPT® 74177) is considered medically necessary if there is a suspected small bowel tumor as a cause of the small bowel obstruction (including a history of no prior abdominal or pelvic surgery, no known hernia and/or concomitant obscure GI bleeding)
- When Crohn's Disease is the suspected cause of small bowel obstruction:
  - See: Suspected **IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)** and **Known IBD (AB-23.2)**
- For small bowel obstruction in individuals with a history of bariatric surgery, see: **Bariatric Surgery Post-Operative Complications (AB-9.1)**

Background and Supporting Information

- Complete or high-grade obstruction can be defined as no fluid or gas passing beyond the site of obstruction. In incomplete or partial obstruction (low-grade), some fluid or gas passes beyond the point of obstruction. A plain film is not required prior to advanced imaging for suspicion of either high- or low- grade obstruction (Chang et al., 2020).

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Evidence Discussion

Evidence synthesized in the ACR Appropriateness Criteria demonstrates that contrast-enhanced CT has high diagnostic accuracy for bowel obstruction, with strong performance in identifying transition points, determining severity, and detecting complications such as ischemia and perforation. Observational studies consistently show that CT findings guide management decisions, particularly in distinguishing partial from complete obstruction and identifying surgically urgent cases (Chang et al., 2020).

Advanced techniques such as CT enterography and enteroclysis improve detection of low-grade or intermittent obstruction by enhancing small bowel distention and mucosal detail. Clinical series report increased diagnostic yield in cases where standard CT is inconclusive and in the evaluation of suspected small bowel tumors, especially in individuals without prior surgery or with obscure gastrointestinal bleeding (Chang et al., 2020).

MRI is supported by safety and diagnostic data in radiation-sensitive populations. ACOG guidance indicates that MRI provides adequate evaluation of abdominal pathology without ionizing radiation and is appropriate in pregnancy when contrast is avoided. Pediatric literature also supports MRI as a radiation-sparing alternative, though limitations in motion sensitivity and availability remain (Committee Opinion No. 723, 2017; Chang et al., 2020).

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Gastroparesis and Dumping Syndrome (AB-20.2)

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Gastroparesis Criteria

- Gastric Emptying Study (CPT® 78264) is considered medically necessary for the suspicion of delayed gastric emptying and ONE of the following:
  - Nausea, or vomiting of food ingested several hours earlier
  - Bloating
  - Early satiety, or postprandial fullness
  - Recurrent aspiration
  - Unexplained poor glucose control in individuals with diabetes
  - Gastroesophageal reflux refractory to medical management
  - Non-ulcer dyspepsia
  - Retained gastric contents identified on endoscopy
- For the evaluation of suspected abnormalities in both total and regional times for small bowel transit
  - Gastric emptying study with small bowel transit (CPT® 78265) is considered medically necessary
- For the evaluation of suspected abnormalities in both total and regional times for colon transit
  - Gastric emptying study with small bowel and colon transit (CPT® 78266) is considered medically necessary

Dumping Syndrome Criteria

- Gastric Emptying Study (CPT® 78264) to evaluate signs or symptoms of dumping syndrome is considered not medically necessary.

Note: For both solid-phase and liquid-phase gastric emptying studies
- If performed on the same day by any protocol, CPT® 78264 should not be reported with two units, only one unit.
- If a solid-phase study is performed, and then on a later date a liquid-phase study is performed, one unit of CPT® 78264 should be reported for each date of service.

Evidence Discussion

Gastric emptying scintigraphy (GES) is the reference standard for evaluating suspected delayed gastric emptying and is supported by clinical studies demonstrating reliable

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quantification of solid-phase gastric transit. Standardized protocols extending to four hours improve sensitivity and support diagnosis in individuals presenting with symptoms such as nausea, vomiting of retained food, early satiety, postprandial fullness, and refractory reflux or dyspepsia (Camilleri et al., 2022; Staller et al., 2025). Evidence shows that GES results correlate with symptom burden and guide clinical management, supporting its use when gastroparesis is suspected (Camilleri et al., 2022; Staller et al., 2025).

GES with combined small bowel or colonic transit assessment is supported in individuals with suspected generalized motility disorders. Physiologic studies demonstrate that abnormalities in gastric emptying may coexist with delayed small bowel or colonic transit, supporting the use of extended protocols to evaluate regional and total transit times when clinically indicated (Camilleri et al., 2022; Staller et al., 2025).

Evidence does not support the use of GES for diagnosing dumping syndrome. Consensus guidelines based on clinical and physiologic studies show low sensitivity and specificity for rapid emptying patterns, with overlap between normal and abnormal results. Variability in gastric emptying dynamics, including compensatory delays following rapid emptying, further limits diagnostic reliability. As a result, dumping syndrome remains a clinical diagnosis, with oral glucose tolerance testing providing more consistent diagnostic evidence (Scarpellini et al., 2020; Scorza et al., 2007).

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Nausea and Vomiting as the Primary Symptom (AB-20.3)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Nausea and vomiting as the primary symptom
  - Prior to advanced imaging, an initial clinical assessment, including a thorough history and physical examination, should be performed. In the absence of findings suggestive of a serious underlying condition and when the etiology remains unclear, laboratory evaluation should be obtained and should include a complete blood count (CBC), chemistry profile, and pregnancy testing in individuals of reproductive age. Subsequent imaging should be guided by the findings of the initial evaluation, as follows:
    - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for ANY of the following:
      - If the initial assessment does not suggest a specific cause
      - If the evaluation proves unproductive
    - Symptoms suggesting mucosal disease (e.g., gastroesophageal reflux disease (GERD), suspicion of ulcer disease):
      - EGD prior to advanced imaging
    - If nausea and vomiting remains unexplained despite workup and CT Abdomen and Pelvis is negative:
      - Gastric emptying study (CPT® 78264)
    - Symptoms suggesting an intracranial etiology (vertigo/nystagmus, associated headache, or neurogenic vomiting suggested by a positional nature and/or associated with other neurologic signs and symptoms):
      - See: **Headache (HD-11)** , **Dizziness, Vertigo and Syncope (HD-23)**, or other Head Imaging Guidelines depending on the predominant neurologic presentation
      - See: **General Guidelines – Other Imaging Situations (HD-1.7)** in the Head Imaging Guidelines for persistent, unexplained nausea and vomiting, when GI evaluation is negative.
    - Nausea and vomiting associated with RUQ pain, dyspeptic symptoms or epigastric pain, see: **Right Upper Quadrant and Epigastric Pain (AB-2.3)**

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Evidence Discussion

Nausea and vomiting should first be evaluated through a structured clinical assessment. Evidence supports the use of detailed history, physical examination, laboratory testing, and pregnancy assessment to identify common etiologies without immediate imaging (Scorza et al., 2007). This approach distinguishes among mucosal, obstructive, endocrine, neurologic, and medication-related causes and directs appropriate next steps.

Targeted testing is guided by clinical suspicion. Upper endoscopy is considered medically necessary when symptoms suggest mucosal disease such as reflux or peptic ulcer disease, and should precede advanced imaging. Similarly, imaging selection should reflect likely etiology rather than routine use. Appropriateness criteria emphasize reserving CT for cases in which the initial evaluation is non-diagnostic or when intra-abdominal pathology, such as obstruction or inflammation, is suspected (Chang et al., 2020; Scheirey et al., 2018).

CT of the abdomen and pelvis with contrast is supported when the initial assessment does not identify a cause or when evaluation remains unproductive. In this setting, CT provides high diagnostic yield for structural and inflammatory conditions that may explain persistent symptoms (Chang et al., 2020; Scheirey et al., 2018).

If nausea and vomiting remain unexplained despite appropriate evaluation and negative CT findings, gastric emptying scintigraphy is supported to assess for delayed gastric emptying. Evidence demonstrates its utility in identifying gastroparesis in individuals with persistent symptoms after exclusion of structural disease (Camilleri et al., 2022; Staller et al., 2025).

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Superior Mesenteric Artery (SMA) Syndrome (AB-20.4)

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Criteria

- CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) are considered medically necessary for clinical suspicion of SMA syndrome and ANY of the following:
  - Recent significant weight loss which leads to a loss of retroperitoneal fat
  - Presence of a severe debilitating illness such as malignancy, malabsorption syndromes, acquired immunodeficiency syndrome (AIDS), high-level trauma, and extensive burns
  - History of corrective spine surgery for scoliosis
  - Anorexia Nervosa
  - Abdominal surgery
  - Congenital short ligament of Treitz
  - Radiologic findings or clinical history suggestive of duodenal obstruction
  - Failure to diagnose persistent nausea and/or vomiting despite the workup outlined in **Nausea and Vomiting as the Primary Symptom (AB-20.3)**

Background and Supporting Information

- Superior mesenteric artery (SMA) syndrome is a rare cause of duodenal obstruction in which there is a decrease in the aortomesenteric angle with resulting compression of the duodenum by the SMA (Haider et al., 2020; Oka et al., 2023).
- The typical clinical scenario includes an episode of weight loss followed by chronic food intolerance with nausea and vomiting, further weight loss, and epigastric pain, and can be relieved by lying prone or in the left lateral decubitus position (Oka et al., 2023; Hakimian & Torkelson, 2023; Sinagra et al., 2018).
- The diagnosis can be suspected with barium studies demonstrating delayed passage of contrast beyond the duodenum, dilatation of the first and second portions of the duodenum, anti-peristaltic flow of barium proximal to the obstruction, and relief of obstruction when placed in the prone, knee-chest, or left lateral position, or with an upper endoscopy revealing pulsatile extrinsic compression of the duodenum, or plain films suggesting duodenal obstruction (Oka et al., 2023; Hakimian & Torkelson, 2023; Sinagra et al., 2018).

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Evidence Discussion

CTA or MRA of the abdomen is the diagnostic standard for suspected superior mesenteric artery (SMA) syndrome, supported by case series and clinical reviews demonstrating accurate visualization of the aortomesenteric angle and distance. These measurements are essential for confirming vascular compression of the third portion of the duodenum and correlate with the clinical features of obstruction (Oka et al., 2023; Sinagra et al., 2018).

The literature identifies predisposing factors such as rapid weight loss, severe catabolic illness, prior spine surgery, and anatomic variants that reduce the aortomesenteric angle and increase the risk of duodenal compression. These clinical contexts support targeted use of CTA or MRA when suspicion is high (Oka et al., 2023; Hakimian & Torkelson, 2023).

Other diagnostic modalities, including upper gastrointestinal studies or endoscopy, may demonstrate duodenal dilation or suggest obstruction but lack specificity and cannot confirm the vascular etiology. As a result, they are considered adjunctive rather than definitive (Haider et al., 2020; Oka et al., 2023).

CTA or MRA is therefore supported when clinical suspicion persists, particularly in individuals with risk factors or unexplained, persistent nausea and vomiting despite prior evaluation. These modalities provide both diagnostic confirmation and exclusion of alternative causes of obstruction, aligning with their use in cases where initial workup is non-diagnostic (Oka et al., 2023; Sinagra et al., 2018; Hakimian & Torkelson, 2023).

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Bloating, Gas, and Distention (AB-20.5)

AB.BO.0020.5.A
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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- For bloating as the primary symptom, present for at least 3 months, see: **Irritable Bowel Syndrome (AB-21.4)**
- For documented suspicion of bowel obstruction (e.g., individuals with prior abdominal surgery, previous history of SBO, known adhesions, history of Crohn's Disease, etc.) see: **Bowel Obstruction (AB-20.1)**.
- If associated with constipation, see: **Constipation (AB-21.3)**
- If associated with dyspeptic symptoms, see: **Right Upper Quadrant and Epigastric Pain (AB-2.3)**
- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if ANY of the following clinical features are present:
  - History of malignancy with documented risk of abdominal or intra-abdominal metastasis
  - Fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher)
  - Elevated WBC greater than 10,000 cells/mm³, or above the upper limit of normal for the particular lab reporting the result
  - Low WBC (absolute neutrophil count less than 1,000 cells/mm³)
  - Palpable abdominal mass of clinical concern
  - GI bleeding, overt or occult, not obviously hemorrhoidal
  - Abdominal tenderness documented as moderate or severe
  - Peritoneal signs, such as guarding or rebound tenderness
  - Suspected complication of bariatric surgery
  - Documentation by the ordering provider that the individual has a "surgical abdomen"
  - Age 60 years or older with unintentional weight loss of 10 pounds or more, or 5% or more of body weight over 6 months or less, without an identifiable reason

Background and Supporting Information

Bloating and abdominal distension are common gastrointestinal complaints, affecting a substantial proportion of individuals with irritable bowel syndrome and an estimated 20–30% of the general population (Lacy et al., 2021; Sperber et al., 2021). Bloating refers to the subjective sensation of increased abdominal pressure, whereas distension

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represents an objective increase in abdominal girth (Lacy et al., 2021; Moshiree et al., 2023).

The American Gastroenterological Association (AGA) has published best practice advice for the evaluation and management of belching, bloating, and distension. These recommendations emphasize the importance of a thorough clinical history and physical examination, targeted evaluation for dietary and functional causes, and selective use of diagnostic testing (Moshiree et al., 2023). The AGA advises that additional diagnostic studies, including serologic testing, endoscopy, imaging, and motility studies, should be guided by clinical presentation and reserved for individuals with concerning features or refractory symptoms (Moshiree et al., 2023).

Evidence Discussion

Determining when symptoms of bloating, gas, and abdominal distension warrant imaging is guided by clinical risk stratification, including individual age, symptom severity, and the presence of alarm features such as weight loss, anemia, gastrointestinal bleeding, or persistent or worsening symptoms (Moshiree et al., 2023; Lacy et al., 2021). In the absence of these features, routine imaging is generally not indicated (Moshiree et al., 2023).

Computed tomography (CT) of the abdomen provides high-resolution, cross-sectional evaluation of the gastrointestinal tract and surrounding structures, particularly when performed with intravenous (IV) and/or oral contrast (American College of Radiology [ACR], 2019). CT imaging allows for comprehensive assessment of intra-abdominal pathology and is highly sensitive for detecting conditions such as bowel obstruction, intra-abdominal malignancy, ischemia, and infectious or inflammatory processes (Chang et al., 2020; Scheirey et al., 2018).

In individuals with concerning clinical features or suspected complications, CT plays an important role in identifying or excluding serious underlying pathology that may not be apparent through clinical evaluation alone. However, its use should be selective, as most individuals with functional gastrointestinal disorders do not have structural abnormalities detectable on imaging (Lacy et al., 2021; Moshiree et al., 2023).

CT imaging involves exposure to ionizing radiation and, when contrast is used, carries additional risks including allergic reaction and contrast-induced nephropathy in susceptible individuals (ACR Committee on Drugs and Contrast Media, 2023). Despite these risks, the rapid image acquisition and high diagnostic accuracy of CT make it an appropriate modality when clinically indicated, particularly in higher-risk individuals where timely diagnosis is critical (Chang et al., 2020; Scheirey et al., 2018).

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Diarrhea, Constipation, and Irritable Bowel (AB-21)

Guideline

Acute and Persistent Diarrhea (Up to 30 Days) (AB-21.1)
Chronic Diarrhea (More than 30 Days) (AB-21.2)
Constipation (AB-21.3)
Irritable Bowel Syndrome (AB-21.4)
Fecal Incontinence (AB-21.5)
References (AB-21)

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Acute and Persistent Diarrhea (Up to 30 Days) (AB-21.1)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Routine advanced imaging is considered not medically necessary for uncomplicated diarrhea (up to 30 days in duration).
- Prior to advanced imaging, individuals with travel and/or dysenteric (including bloody) diarrhea should undergo biological assessment and/or antimicrobial treatment.
- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if:
  - Suspected ischemia (See: **Mesenteric Ischemia (AB-6.1)** and **Colonic Ischemia (AB-6.2)**) OR
  - Individuals older than 50 years of age with significant abdominal pain OR
  - Previous gastric bypass OR
  - Immunocompromised OR
  - Obstruction, toxic megacolon, or perforation suspected

Evidence Discussion

Acute diarrhea is most often due to self-limited infectious causes, with resolution typically occurring within one to four weeks. In this setting, routine advanced imaging has low diagnostic yield and is considered not medically necessary. Evaluation is guided by clinical assessment, with stool-based testing and, when indicated, empiric antimicrobial therapy in individuals with travel-associated or dysenteric diarrhea (Shane et al., 2017; Hamilton & Cifu, 2019; Smalley et al., 2019).

CT of the abdomen and pelvis with intravenous contrast is appropriate when clinical features raise concern for complications or alternative diagnoses associated with increased morbidity. These include suspected bowel ischemia, obstruction, perforation, or toxic megacolon, as well as presentations in higher-risk populations such as older adults with significant abdominal pain, individuals with prior gastric bypass, and those who are immunocompromised. In these settings, CT provides accurate detection of structural and vascular pathology, including obstruction, perforation, severe colitis, and impaired bowel perfusion. Intravenous contrast improves evaluation of bowel wall enhancement and mesenteric vasculature, which is essential for identifying ischemic

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or inflammatory processes (Hamilton & Cifu, 2019; McDonald et al., 2018; Ihara et al., 2024).

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Chronic Diarrhea (More than 30 Days) (AB-21.2)

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Criteria

- Prior to advanced imaging, basic lab work should include routine CBC, chemistries, as well as stool tests for pathogens.
- CT Abdomen with contrast (CPT® 74160), CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197), is considered medically necessary if ALL of the following have been performed:
  - Colonoscopy has been performed and is nondiagnostic or suggestive of inflammatory bowel disease
  - Fecal calprotectin or fecal lactoferrin testing has been performed
  - Testing for giardia antigen or polymerase chain reaction (PCR) for giardia have been performed
  - Testing for celiac disease with serum immunoglobulin A (IgA) tissue transglutaminase (tTG) has been performed.
- See: **Suspected IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)** for concerns regarding inflammatory bowel disease.

Evidence Discussion

Chronic diarrhea is defined as symptoms persisting or recurring for four weeks or longer, reflecting a shift from primarily infectious causes to functional, inflammatory, malabsorptive, or structural conditions (Ihara et al., 2024; Arasaradnam et al., 2018). Initial evaluation is non-imaging based and includes laboratory testing, stool studies, and endoscopic assessment. Recommended testing includes complete blood count, serum chemistries, stool studies for infectious pathogens, fecal inflammatory markers such as calprotectin or lactoferrin, and targeted testing for conditions including celiac disease and giardiasis (Smalley et al., 2019; Burgers et al., 2020; Arasaradnam et al., 2018).

Cross-sectional imaging is appropriate only after this evaluation has been completed and remains nondiagnostic, including colonoscopy findings that are either unrevealing or suggestive of inflammatory bowel disease. In this context, CT of the abdomen or abdomen and pelvis with contrast is indicated for suspected obstruction, malignancy, or extra-luminal disease. CT enterography or MR enterography is appropriate when small bowel pathology is suspected, particularly Crohn's disease, as these techniques improve evaluation of mucosal and transmural inflammation (Arasaradnam et al., 2018;

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Ihara et al., 2024). MRI may be preferred when radiation avoidance is desired, while CT remains widely used due to availability and diagnostic accuracy (Arasaradnam et al., 2018; Ihara et al., 2024).

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Constipation (AB-21.3)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if:
  - Concern for obstruction
- MRI (MRI Pelvis without contrast CPT® 72195) for Defecography is considered investigational/experimental by UHC.

Background and Supporting Information

Gastroenterology and colorectal surgery society guidelines recommend colonoscopy as part of the initial evaluation in individuals with chronic constipation who present with alarm features such as hematochezia, anemia, or unintentional weight loss to exclude malignancy or other serious pathology (Alavi et al., 2024; Wald et al., 2021).

Evidence Discussion

Clinical presentation and results of minimally invasive testing guide the appropriate use of imaging in constipation. Evidence-based guidelines and systematic reviews consistently demonstrate that imaging is not routinely indicated in uncomplicated constipation and should be reserved for individuals with alarm features, suspected secondary causes, or refractory symptoms after initial evaluation (Luo et al., 2025; Wald et al., 2021; Alavi et al., 2024).

Cross-sectional imaging with computed tomography (CT) plays a central role in individuals presenting with constipation accompanied by red flag symptoms such as weight loss, anemia, gastrointestinal bleeding, or suspected infection or malignancy. Evidence demonstrates that CT has a high diagnostic yield for identifying secondary causes of constipation, including obstructive lesions, inflammatory processes, and malignancy, due to its ability to evaluate both the bowel and extraintestinal structures (Alavi et al., 2024; Rao et al., 2026). The rapid acquisition time further supports its use in acute or clinically complex presentations. While CT involves ionizing radiation and potential risks related to intravenous contrast, these risks are outweighed in clinical scenarios where serious underlying pathology is suspected and timely diagnosis is necessary (Rao et al., 2026).

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Irritable Bowel Syndrome (AB-21.4)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Advanced imaging in the absence of alarm symptoms has a low diagnostic yield, however imaging can be considered medically necessary in the following circumstances:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary in the following circumstances:
    - Presence of ANY of the following alarm symptoms:
      - Unintentional weight loss of 10 pounds or more or 5% or more of body weight over 6 months or less, without an identifiable cause.
      - Frequent nocturnal awakenings due to gastrointestinal symptoms
      - Fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher)
      - Blood in the stool or iron deficiency anemia (See: **GI Bleeding (AB-22)** for appropriateness of imaging in this circumstance)
      - New onset and progressive symptoms
      - Onset of symptoms after age 50
      - Family history of colon cancer or inflammatory bowel disease
      - Findings of an abdominal mass
      - Presence of lymphadenopathy
    - After ALL of the following studies have been performed:
      - Fecal calprotectin of 50ug/g or greater, fecal lactoferrin of 4.0ug/g or greater, or CRP greater than 0.5 in individuals with diarrhea-predominance
      - Testing for giardia antigen or PCR for giardia
      - Celiac testing should also be performed in individuals with diarrhea-predominance IBS, and if positive see: **Celiac Disease (AB-24.1)** for imaging guidance.

Background and Supporting Information

Irritable bowel syndrome (IBS) is a disorder of gut–brain interaction characterized by recurrent abdominal pain associated with altered bowel habits, abdominal distention, and bloating (Drossman et al., 2026; Lacy et al., 2021; Vasant et al., 2021). IBS is a positive clinical diagnosis rather than a diagnosis of exclusion, and current guidelines

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recommend a symptom-based diagnostic approach (Lacy et al., 2021; Drossman et al., 2026).

IBS is classified into subtypes based on predominant stool pattern, including constipation-predominant (IBS-C), diarrhea-predominant (IBS-D), mixed (IBS-M), and unclassified IBS (Lacy et al., 2021; Savarino et al., 2022).

The Rome V framework continues to define IBS using symptom-based diagnostic criteria centered on recurrent abdominal discomfort or pain associated with defecation and changes in stool frequency or form at least three days per month, while further emphasizing its classification as a disorder of gut–brain interaction (Drossman et al., 2026; Lacy et al., 2021).

Evidence Discussion

Risk stratification based on demographic and clinical factors,such as age, family history, symptom onset, associated alarm features, and physical examination findings, determines when imaging is medically necessary in individuals with suspected irritable bowel syndrome (IBS). Evidence-based guidelines consistently emphasize that routine imaging is not indicated in individuals with typical IBS symptoms who meet symptom-based diagnostic criteria in the absence of alarm features (Lacy et al., 2021; Vasant et al., 2021; Drossman et al., 2026).

Imaging is reserved for a subset of individuals in whom clinical features raise concern for alternative or serious underlying pathology. Alarm features, including gastrointestinal bleeding, anemia, unintentional weight loss, nocturnal symptoms, or a family history of colorectal cancer or inflammatory bowel disease, warrant further diagnostic evaluation to exclude inflammatory or malignant conditions (Lacy et al., 2021; Vasant et al., 2021).

Cross-sectional imaging, particularly computed tomography (CT), is supported in these higher-risk populations due to its ability to detect structural, inflammatory, and neoplastic processes affecting the gastrointestinal tract and surrounding structures (Savarino et al., 2022; Vasant et al., 2021). CT demonstrates high diagnostic utility in identifying conditions such as bowel obstruction, inflammatory bowel disease, and malignancy, particularly in individuals with atypical presentations or concerning clinical features (Savarino et al., 2022).

The use of CT must be balanced against its risks, including exposure to ionizing radiation and potential adverse effects from intravenous contrast. However, in appropriately selected high-risk individuals, the diagnostic benefit of CT imaging outweighs these risks by enabling timely identification of clinically significant pathology that would not be expected in uncomplicated IBS (Lacy et al., 2021; Drossman et al., 2026; Vasant et al., 2021).

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Fecal Incontinence (AB-21.5)

AB.FI.0021.5.U
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Criteria

The evaluation of fecal incontinence generally proceeds as follows:

- Determine the severity of the incontinence (Bristol Stool Scale, Fecal Incontinence Severity Index, etc.)
- History and physical to include digital rectal examination and perianal pinprick (to assess for neurogenic causes)
- Trial of conservative management
- Diagnostic testing if symptoms persist to include:
  - Ano-rectal Manometry (manometry, sensation, volume tolerance, and compliance)
  - Balloon Expulsion Test
  - Endoanal ultrasound (CPT® 76872) to confirm sphincter defects in individuals with suspected sphincter injury (e.g. history of vaginal delivery or anorectal surgery)
  - MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary if:
    - Ano-rectal manometry suggests weak sphincter pressures **AND/OR** there is an abnormal balloon expulsion test **AND**
    - There has been failure of a trial of conservative management since the onset of or change in symptoms **AND**
    - Results of imaging would modify planned management
- MRI (MRI Pelvis without contrast CPT® 72195) for Defecography is considered investigational/experimental by UHC.

Background and Supporting Information

Fecal incontinence (FI) is the recurrent involuntary passage of stool and may result from impairment of the anal sphincter complex, pelvic floor dysfunction, altered rectal sensation or compliance, or neurologic dysfunction (Wald et al., 2021).

The American Society of Colon and Rectal Surgeons (ASCRS) recommends endoanal ultrasound (EAUS) as a useful diagnostic tool in the evaluation of individuals with fecal incontinence, particularly in individuals with a history of vaginal delivery or anorectal surgery. EAUS can identify internal and external anal sphincter defects that may contribute to sphincter dysfunction (Bordeianou et al., 2023).

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The American College of Gastroenterology (ACG) and ASCRS recommend physiologic testing, including anorectal manometry and balloon expulsion testing, in individuals whose symptoms persist despite conservative management to further characterize anorectal function and guide treatment decisions (Wald et al., 2021; Bordeianou et al., 2023).

Evidence Discussion

The evaluation of fecal incontinence begins with a comprehensive history and physical examination, including anorectal examination, to identify potential structural, neurologic, and functional causes of symptoms. Professional society guidelines from the American College of Gastroenterology (ACG), American Society of Colon and Rectal Surgeons (ASCRS), and American College of Obstetricians and Gynecologists (ACOG) support this approach as the foundation of diagnostic evaluation (ACOG, 2019; Bordeianou et al., 2023; Wald et al., 2021).

For individuals who fail conservative management, anorectal manometry and balloon expulsion testing provide objective assessment of anorectal sensation, sphincter function, rectal compliance, and defecatory dysfunction. These tests help guide subsequent diagnostic evaluation and therapeutic decision-making (Sbeit et al., 2021; Wald et al., 2021).

Evidence supports EAUS as the preferred imaging modality for suspected anal sphincter injury. EAUS is widely available, well tolerated, and demonstrates high diagnostic accuracy for identifying internal and external anal sphincter defects. In addition, studies have shown good interobserver agreement for the detection and characterization of sphincter abnormalities, supporting its role as the first-line imaging examination in individuals with suspected obstetric or surgery-related sphincter injury (Bordeianou et al., 2023; Sbeit et al., 2021).

MRI provides complementary anatomic information in the evaluation of fecal incontinence. The ACG notes that EAUS more clearly visualizes the internal anal sphincter, whereas MRI is superior for distinguishing external anal sphincter tears from scar tissue and for identifying external sphincter atrophy (Wald et al., 2021). MRI defecography may also provide functional assessment of pelvic floor disorders and impaired evacuation. Accordingly, MRI is most appropriately utilized when physiologic testing demonstrates abnormalities and surgical intervention is being considered, or when additional characterization of sphincter pathology is needed beyond that provided by EAUS (Sbeit et al., 2021; Wald et al., 2021).

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GI Bleeding (AB-22)

Guideline

GI Bleeding (AB-22.1)
Small Bowel Bleeding Suspected (AB-22.2)
References (AB-22)

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GI Bleeding (AB-22.1)

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Criteria

- CTA Abdomen (CPT® 74175), CTA Abdomen and Pelvis (CPT® 74174), or CT Abdomen and Pelvis with contrast (CPT® 74177) are considered medically necessary for the initial evaluation of ANY of the following:
  - If therapeutic angiography is being considered
  - If colonoscopy cannot be performed in an individual with active lower GI bleeding
  - If endoscopy cannot be performed in an individual with active upper GI bleeding
  - If surgery is being considered for treatment of GI bleeding
  - GI bleeding with moderate to severe abdominal pain and/or tenderness
  - GI bleeding and hemodynamic instability
  - If there is concern for an aorto-enteric fistula, including known or suspected aortic aneurysm, or history of any type of aortic aneurysm repair
- If there is brisk active GI bleeding AND endoscopy does not reveal a source
  - Gastrointestinal Bleeding Scintigraphy (CPT® 78278) is considered medically necessary
- Iron Deficiency Anemia:
  - If the bleeding is of suspected gastrointestinal origin:
    - Upper endoscopy and colonoscopy should be performed, unless contraindicated
    - Small bowel video capsule endoscopy is medically necessary, if upper and lower endoscopies are negative
    - If small bowel video capsule endoscopy is negative OR for further evaluation of abnormal video capsule findings ONE of the following is considered medically necessary:
      - CT Abdomen and Pelvis with contrast (CPT® 74177)
      - CT Enterography (CPT® 74177)
      - MR Entergraphy (CPT® 74183 or CPT® 74183 and CPT® 72197) is medically necessary if there is a contraindication to CT Enterography.
- If the bleeding is determined to be non-gastrointestinal, refer to the appropriate condition-based guideline.

Evidence Discussion

Cross-sectional imaging is used selectively in gastrointestinal bleeding based on severity, hemodynamic status, and whether endoscopy can be performed. When endoscopy is not feasible, incomplete, or nondiagnostic in the setting of ongoing or

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brisk bleeding, CT angiography (CTA) is the preferred next step (Sengupta et al., 2024; Nagpal et al., 2024).

CTA enables rapid detection and precise localization of active hemorrhage, typically at bleeding rates of 0.3 to 0.5 mL/min, while also identifying underlying causes. This capability is critical when therapeutic angiography or surgery is being considered, as localization improves procedural success and reduces unnecessary intervention (Wortman et al., 2017; Sengupta et al., 2024). It is also well suited for individuals with hemodynamic instability or abdominal pain, where evaluation of vascular, mesenteric, and extraluminal pathology is required (Nagpal et al., 2024; Sengupta et al., 2024).

Gastrointestinal bleeding scintigraphy detects slower or intermittent bleeding at lower rates but lacks anatomic precision. Its role is therefore limited to cases where bleeding is not brisk or CTA is nondiagnostic (Sengupta et al., 2024).

In iron deficiency anemia, bidirectional endoscopy is the initial evaluation. When negative, capsule endoscopy is recommended for small bowel assessment. Cross-sectional imaging is reserved for cases with negative or inconclusive capsule findings or when further anatomical characterization is required (DeLoughery et al., 2024; Pennazio et al., 2023; Thakral et al., 2024; Auerbach et al., 2025).

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Small Bowel Bleeding Suspected (AB-22.2)

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Criteria

- If the small bowel is the suspected source of bleeding, and if endoscopic studies (upper endoscopy, colonoscopy and if available video capsule endoscopy) are unrevealing:
  - CT Enterography (CPT® 74177) is considered medically necessary
  - MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) is considered medically necessary, if there is a contraindication to CT Enterography
- Meckel's scan (CPT® 78290) is considered medically necessary if bleeding is suspected from a Meckel's diverticulum.

Evidence Discussion

Small bowel bleeding is an uncommon but important cause of persistent bleeding after negative upper and lower endoscopy. Evaluation prioritizes mucosal visualization followed by selective use of cross-sectional imaging (Pennazio et al., 2023; Thakral et al., 2024).

Video capsule endoscopy (VCE) is the first-line test in stable individuals, as it allows noninvasive visualization of the small bowel with a high diagnostic yield and strong predictive value for clinically significant lesions (Pennazio et al., 2023; Wild & Ko, 2025). Findings from VCE frequently guide therapeutic endoscopy, surgery, or medical management (Pennazio et al., 2023; Thakral et al., 2024).

Routine imaging prior to VCE is not indicated. CT or MR enterography should be obtained before capsule placement only in individuals at risk for retention, including those with obstructive symptoms, Crohn's disease, prior radiation, or suspected tumors (Pennazio et al., 2023).

Following a negative or inconclusive VCE, CT enterography is generally preferred due to its availability and high spatial resolution. It allows detection and characterization of masses, vascular lesions, and inflammatory disease not fully defined on capsule imaging (Thakral et al., 2024; Wild & Ko, 2025; Pennazio et al., 2023). MR enterography is a reasonable alternative when radiation exposure is a concern but is used less frequently due to practical limitations (Pennazio et al., 2023; Thakral et al., 2024).

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Inflammatory Bowel Disease (AB-23)

Guideline

Suspected IBD (Crohn’s Disease or Ulcerative Colitis) (AB-23.1)
Known IBD (AB-23.2)
Perirectal/Perianal Crohn's Disease (AB-23.3)
Primary Sclerosing Cholangitis (PSC) (AB-23.4)
References (AB-23)

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Suspected IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)

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Criteria

- Suspected Crohn's Disease or Ulcerative Colitis:
  - CT Abdomen and Pelvis with contrast (CPT® 74177) OR CT Enterography (CPT® 74177) OR MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) is considered medically necessary for ANY of the following:
    - History of malignancy with documented risk of abdominal or intra-abdominal metastasis
    - Fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher)
    - Elevated WBC greater than 10,000 cells/mm³, or above the upper limit of normal for the particular lab reporting the result
    - Palpable abdominal mass of clinical concern
    - GI bleeding, overt or occult, not obviously hemorrhoidal
    - Abdominal tenderness documented as moderate or severe
    - Peritoneal signs, such as guarding or rebound tenderness
    - Suspected complication of bariatric surgery
    - Documentation by the ordering provider that the individual has a "surgical abdomen"
    - Age 60 years or older with unintentional weight loss of 10 pounds or more, or 5% or more of body weight over 6 months or less, without an identifiable reason
  - Chronic diarrhea without the above signs or symptoms, see: **Diarrhea, Constipation, and Irritable Bowel (AB-21)**
  - CT Enterography (CPT® 74177) OR MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) is considered medically necessary for the evaluation of chronic abdominal pain with diarrhea in the absence of red flag criteria (as noted in **General Guidelines AB-1.0**) when there is documented concern for inflammatory bowel disease and if ANY of the following:
    - There is a positive family history of inflammatory bowel disease, **OR**
    - There are endoscopy or colonoscopy findings suggestive of inflammatory bowel disease, **OR**
    - Elevated inflammatory markers (fecal lactoferrin of 4.0 ug/g or greater, CRP greater than 0.5 mg/dL, or fecal calprotectin 50 ug/g or greater), **OR**
    - Diagnosis is still in doubt after colonoscopy and evaluation of inflammatory markers, and Crohn's disease is suspected

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- CT Abdomen and Pelvis with or without contrast (CPT® 74177 or CPT® 74176) can be performed prior to endoscopy if requested by or in consultation with the provider who will be performing the endoscopy.

Background and Supporting Information

Serologic and genetic markers have been investigated for their potential role in the diagnosis of inflammatory bowel disease (IBD). These markers may be considered in select clinical scenarios where conventional diagnostic evaluations are inconclusive; however, current clinical guidelines do not recommend their routine use for screening or diagnosis in individuals presenting with gastrointestinal symptoms (Lichtenstein et al., 2025; Rubin et al., 2025; Smalley et al., 2019).

In particular, the presence of an isolated positive serologic or genetic marker, without corroborating clinical findings such as elevated inflammatory biomarkers or abnormal endoscopic evaluation, is not sufficient to establish a diagnosis of IBD (Lichtenstein et al., 2025; Rubin et al., 2025). As a result, such findings alone should not be used to guide decisions regarding advanced imaging.

Commonly evaluated serologic markers include anti-glycan antibodies (e.g., anti-Saccharomyces cerevisiae antibodies [ASCA], anti-chitobioside carbohydrate antibodies [ACCA], anti-laminaribioside carbohydrate antibodies [ALCA], anti-mannobioside carbohydrate antibodies [AMCA]), as well as anti–outer membrane porin C (anti-OmpC), anti-CBir1, perinuclear anti-neutrophil cytoplasmic antibodies (pANCA), pancreatic antibodies (PAB), and goblet cell antibodies (GAB). These markers may provide adjunctive information but lack sufficient sensitivity and specificity to independently confirm or exclude disease (Lichtenstein et al., 2025; Rubin et al., 2025).

Evidence Discussion

The use of noninvasive biomarkers and imaging modalities in suspected inflammatory bowel disease (IBD) has been extensively evaluated to determine their diagnostic utility and appropriate role in clinical decision-making. Current evidence supports the use of inflammatory biomarkers, such as fecal calprotectin and C-reactive protein (CRP), as effective tools for risk stratification and exclusion of disease in low-risk individuals.

A meta-analysis demonstrated that low levels of fecal calprotectin (less than 40 mcg/g) or CRP (0.5 mg/dL or less) are associated with a high negative predictive value for IBD, supporting their role in distinguishing functional gastrointestinal disorders, such as irritable bowel syndrome, from inflammatory conditions. These findings indicate that, in the absence of objective inflammatory markers, the likelihood of underlying IBD is low and further invasive or advanced diagnostic testing may not be warranted (Smalley et al., 2019; Lichtenstein et al., 2025).

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Similarly, Katsinelos et al. evaluated the diagnostic yield of capsule endoscopy in individuals presenting with abdominal pain and diarrhea. The study demonstrated a diagnostic yield of 90.1% in individuals with elevated inflammatory markers, compared to 0% in those without evidence of inflammation. These findings highlight the limited utility of advanced imaging modalities, such as capsule endoscopy, in individuals without biochemical or clinical evidence of inflammatory disease (Katsinelos et al., 2011).

Consistent with these data, the Canadian Association of Gastroenterology (CAG) recommends against the routine use of capsule endoscopy in individuals presenting with chronic abdominal pain or diarrhea in the absence of abnormal inflammatory biomarkers or prior abnormal endoscopic or imaging findings (Enns et al., 2017). This recommendation reflects the low diagnostic yield and limited clinical value of advanced imaging in low-risk populations.

Additional guidance from professional societies, including the American College of Gastroenterology (ACG) and the American College of Radiology (ACR), emphasizes that imaging and advanced diagnostic evaluation should be reserved for individuals with objective evidence of inflammation or other findings suggestive of IBD (Kim et al., 2020; Lichtenstein et al., 2025; Rubin et al., 2019). These recommendations support a stepwise diagnostic approach in which noninvasive biomarkers are used to guide the need for further testing.

Further imaging-based studies have demonstrated the utility of modalities such as MR enterography in assessing disease activity when IBD is clinically suspected and supported by objective findings, reinforcing that imaging is most effective when applied in appropriately selected individual populations (Kim et al., 2017; Soydan et al., 2019).

Collectively, the available evidence demonstrates that in individuals without objective evidence of inflammation, such as normal fecal calprotectin, normal CRP, and unremarkable endoscopic findings, the diagnostic yield of advanced imaging is low. Accordingly, the routine use of advanced imaging in this population is unlikely to provide clinically meaningful benefit and is not supported by current evidence-based guidelines (Enns et al., 2017; Kim et al., 2020; Lichtenstein et al., 2025; Rubin et al., 2019).

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Known IBD (AB-23.2)

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Criteria

- CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195) is considered medically necessary for individuals with known Crohn's Disease or Ulcerative Colitis and ANY of the following:
  - To determine change in treatment
  - Monitoring response to therapy
  - Suspected complications including abscess, perforation, fistula, or obstruction

Evidence Discussion

Cross-sectional imaging is indicated in established inflammatory bowel disease (IBD) when objective assessment of inflammation or complications will alter management. Both CT enterography and MR enterography (MRE) demonstrate high accuracy for detecting active disease and complications, including abscess, fistula, perforation, and obstruction (Lichtenstein et al., 2025). These findings directly inform treatment modification, as imaging-defined inflammation and penetrating disease correlate with the need for escalation or change in therapy (Lichtenstein et al., 2025; Rubin et al., 2025).

MRE is preferred for serial evaluation due to the absence of ionizing radiation, while maintaining diagnostic performance comparable to CT (Lichtenstein et al., 2025). Diffusion-weighted imaging further improves sensitivity to active inflammation and correlates with endoscopic severity, supporting its role in monitoring treatment response (Kim et al., 2017; Soydan et al., 2019). CT remains appropriate when rapid evaluation is required, particularly in suspected acute complications.

The literature consistently supports the use of CT or MRE in individuals with known IBD for three indications: guiding treatment changes, assessing response to therapy, and evaluating suspected complications, where imaging findings provide clinically actionable information (Kim et al., 2020; Lichtenstein et al., 2025; Rubin et al., 2025).

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Perirectal/Perianal Crohn's Disease (AB-23.3)

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Criteria

- Perirectal/Perianal Fistula:
  - MRI Pelvis without and with contrast (CPT® 72197)
  - Endoscopic ultrasound is preferential to CT in this setting.
  - CT Pelvis with contrast (CPT® 72193) is an inferior study in this setting, and should be reserved for situations in which MRI or Endoscopic ultrasound cannot be performed.
- Perirectal/Perianal Abscess:
  - MRI Pelvis without and with contrast (CPT® 72197)
  - CT Pelvis with contrast (CPT® 72193) is inferior but can be considered medically necessary as an alternative if desired.

This section is applicable to individuals with Crohn's Disease. See: **Fistula in Ano (PV-21.1)** and **Perirectal Abscess (PV-21.2)** in the Pelvis Imaging Guidelines for non-Crohn's related perirectal and/or perianal fistulae.

Evidence Discussion

Accurate imaging of perianal and perirectal Crohn's disease requires clear delineation of fistula tracts and detection of associated abscess. MRI pelvis provides superior soft tissue resolution, allowing precise characterization of fistulas and their relationship to sphincter structures, which supports its role as the preferred modality (Kim et al., 2020; Lichtenstein et al., 2025).

Endoscopic ultrasound offers comparable accuracy for fistula detection in selected cases and is preferred over CT when MRI is not feasible. CT pelvis with contrast reliably detects abscess but has limited sensitivity for defining fistulous tracts due to lower spatial resolution (Kim et al., 2020).

Accordingly, MRI is preferred for both fistula and abscess evaluation, endoscopic ultrasound is an appropriate alternative for fistula assessment, and CT should be reserved for cases where MRI or ultrasound cannot be performed, or when rapid assessment of suspected abscess is needed (Kim et al., 2020; Lichtenstein et al., 2025).

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Primary Sclerosing Cholangitis (PSC) (AB-23.4)

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Criteria

- Primary Sclerosing Cholangitis (PSC):
  - MRCP is considered medically necessary to assess for PSC in those:
    - with IBD and any elevated liver function study (including alkaline phosphatase, gamma-glutamyl transpeptidase (GGTP), bilirubin, AST, or ALT)
    - without IBD, but with persistent cholestatic liver tests. (See: **Abnormal Liver Chemistries (AB-30)**)
  - Ultrasound (CPT® 76700 or 76705) or MRI/MRCP is considered medically necessary as surveillance for cholangiocarcinoma in individuals with PSC every 6 months.

Background and Supporting Information

Primary sclerosing cholangitis (PSC) is a chronic, progressive disease of the liver and biliary tract characterized by inflammation, fibrosis, and multifocal stricturing of the intrahepatic and extrahepatic bile ducts (European Association for the Study of the Liver [EASL], 2022). The disease can lead to progressive cholestasis, biliary cirrhosis, and ultimately end-stage liver disease.

PSC is strongly associated with inflammatory bowel disease (IBD), particularly ulcerative colitis, and may occur in individuals with or without known IBD (EASL, 2022; Assis & Bowlus, 2023). Biliary obstruction can occur at various levels within the biliary tree and may result in complications such as recurrent cholangitis.

Individuals with PSC are at increased risk for hepatobiliary malignancies, particularly cholangiocarcinoma, which should be considered in the presence of dominant strictures. There is also an increased risk of gallbladder polyps and other malignancies (Assis & Bowlus, 2023; EASL, 2022).

Given the progressive nature of the disease and the associated risk of malignancy, imaging plays an important role in the diagnosis, risk stratification, and longitudinal surveillance of individuals with PSC (EASL, 2022; Venkatesh et al., 2022).

Evidence Discussion

Magnetic resonance cholangiopancreatography (MRCP) is the preferred noninvasive modality for diagnosing primary sclerosing cholangitis (PSC), as it provides high-

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resolution visualization of multifocal biliary strictures without the risks associated with invasive procedures (EASL, 2022; Assis & Bowlus, 2023; Venkatesh et al., 2022). This supports its use in individuals with suspected PSC, including those with inflammatory bowel disease or persistent cholestatic liver enzyme abnormalities.

MRI-based imaging is also central to surveillance due to the elevated risk of cholangiocarcinoma. Observational data demonstrate an association between routine MRI surveillance and improved survival, likely driven by earlier detection of malignancy and disease progression (Tan et al., 2024). Comparative studies further show that MRI outperforms ultrasound in detecting early-stage cholangiocarcinoma, identifying lesions with more favorable prognostic features (Eaton et al., 2021; Tan et al., 2024).

Guidelines support ongoing surveillance with cross-sectional imaging, although optimal intervals are not standardized and should be guided by individual risk factors. Overall, the evidence supports MRCP for diagnosis and MRI-based imaging for surveillance in PSC, given their diagnostic performance and clinical impact (EASL, 2022; Assis & Bowlus, 2023; Venkatesh et al., 2022).

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Celiac Disease (Sprue) (AB-24)

Guideline

Celiac Disease (AB-24.1)
References (AB-24)

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Celiac Disease (AB-24.1)

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Criteria

- CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enteroclysis (CPT® 74176 or CPT® 74177), or CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183, or CPT® 74183 and CPT® 72197) is considered medically necessary for:
  - one-time study after initial, confirmed diagnosis of celiac disease OR
  - confirmed celiac disease and new or continued symptoms (e.g., bloating, diarrhea, abdominal pain, unintentional weight loss, abdominal distention, evidence of malabsorption, or anemia) despite adherence to 6 months of a gluten free diet

Background and Supporting Information

Celiac disease is an autoimmune disorder characterized by immune-mediated damage to the small intestinal villi following ingestion of gluten (wheat, barley, and rye) (Austin et al., 2024; Rubio-Tapia et al., 2023).

Potential complications include ulcerative jejunitis, lymphoma, and small intestinal adenocarcinoma (Rubio-Tapia et al., 2023).

Diagnosis is typically initiated with serologic antibody testing and confirmed with small bowel biopsy obtained via endoscopy (Austin et al., 2024; Rubio-Tapia et al., 2023).

Capsule endoscopy may be considered in individuals with positive serology and negative biopsy results or when endoscopy is contraindicated (Rubio-Tapia et al., 2023; Austin et al., 2024).

Evidence Discussion

Serologic testing and upper endoscopy with small bowel biopsy remain the standard methods for confirming the diagnosis of celiac disease (Austin et al., 2024; Rubio-Tapia et al., 2023).

Cross-sectional imaging modalities, including CT enterography and MR enterography, provide noninvasive evaluation of the small bowel and are increasingly utilized to assess disease extent and detect complications such as ulcerative jejunoileitis, lymphoma, and small bowel malignancy (Penizzotto et al., 2024; Wang et al., 2024). These techniques enable detailed visualization of bowel wall abnormalities as well as extraintestinal findings, including mesenteric lymphadenopathy, which may indicate more advanced or complicated disease (Penizzotto et al., 2024; Rossi et al., 2023).

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Magnetic resonance enterography has demonstrated correlation with endoscopic, histologic, and serologic findings in individuals with nonresponsive celiac disease, supporting its role in evaluating persistent or refractory symptoms (Radmard et al., 2017). Imaging is particularly valuable in individuals with suspected complications or those who fail to respond to standard therapy, where further diagnostic clarification is necessary to guide management (Green et al., 2022; Rubio-Tapia et al., 2023).

Overall, cross-sectional imaging serves as an important adjunct in select clinical scenarios, facilitating early identification of complications and supporting timely intervention to reduce morbidity (Wang et al., 2024; Penizzotto et al., 2024; Green et al., 2022).

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CT Colonography (CTC) (AB-25)

Guideline

CTC (AB-25.1)
References (AB-25)

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CTC (AB-25.1)

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Note:

A screening CTC (CPT® 74263) can ONLY be used for an individual who is a candidate for average risk screening as defined below. It cannot be used for any other indication. If the request for a CTC is for any other reason than average risk screening, please refer to diagnostic CTC indications. A diagnostic CTC would be the appropriate code, if approvable, for any other reason than average risk screening. This would include surveillance for a history of colon polyps, the evaluation of a change in bowel habits, abdominal pain, bleeding, etc. Please refer to the definition below of an average-risk individual, as well as the circumstances for which a diagnostic CTC is appropriate.

Criteria

- Screening CTC (CPT® 74263) for colorectal cancer is considered NOT medically necessary if:
  - FIT-DNA (multi-targeted stool DNA test) within the last 3 years, OR
  - colonoscopy within the last 10 years
- Screening CTC (CPT® 74263) is considered medically necessary every 5 years for colorectal cancer for:
  - Average-risk individuals ages 45 to 75
    - Average risk is defined as:
      - no previously diagnosed colorectal cancer, or colonic adenomas, or inflammatory bowel disease involving the colon
  - Individuals between 76 to 85 if there is no history of a previously negative colonoscopy or CTC, or, if in the opinion of the provider, the benefits of screening outweigh the risks.
  - Individuals with a SINGLE first-degree relative diagnosed after 60 years of age with colorectal cancer or an advanced adenoma can be screened with CTC beginning at age 40.
    - If there are 2 or more first degree relatives at any age with CRC or an advanced adenoma, or a first degree relative diagnosed before 60 years of age, the individual should be screened via colonoscopy, not CTC.
- Diagnostic CTC without contrast (CPT® 74261) is considered medically necessary for:
  - Failed conventional colonoscopy due to a known colonic lesion, structural abnormality, or technical difficulty, and/or

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  - Conventional colonoscopy is considered medically contraindicated. Contraindications may include:
    - Coagulopathy
    - Intolerance to sedation
    - Elderly individuals 80 years of age or older
    - Recent (within the last 60 days) myocardial infarction (MI)
- Diagnostic CTC with contrast (CPT® 74262) is considered medically necessary if:
  - there is a known obstructing colorectal malignancy, when imaging is required for pre-operative staging, if desired.
  - there is a clearly stated indication for IV contrast to evaluate extra-colonic organs. When performed in this setting, a CTC with contrast will substitute for a CT Abdomen and Pelvis such that an additional CT Abdomen and Pelvis would generally not be considered medically necessary.
- MRI Colonography:
  - Currently, no published society-endorsed guideline with respect to colorectal cancer screening lists MRI Colonography as an alternative screening study. As such, requests for MRI Colonography would be considered investigational at this time. There is no specific CPT assigned for this procedure. It is sometimes requested as an MRI Abdomen and MRI Pelvis.

Background and Supporting Information

CT Colonography is a minimally invasive imaging modality used to evaluate the colon for polyps and colorectal cancer. The procedure is typically performed without intravenous contrast, as bowel preparation, colonic insufflation, and thin-section CT imaging provide adequate visualization of the colonic mucosa (Thomas et al., 2025; Wolf et al., 2018).

Evidence Discussion

Guideline recommendations vary slightly in preferred colorectal cancer (CRC) screening strategies for asymptomatic, average-risk individuals; however, multiple organizations recognize CT colonography (CTC) as an acceptable screening option. The US Preventive Services Task Force and the American Cancer Society include CTC among recommended screening modalities for average-risk adults (Davidson et al., 2021; Wolf et al., 2018).

CT colonography is generally not recommended for individuals at increased risk for colorectal cancer, including those with a personal history of adenomas or colorectal cancer, inflammatory bowel disease, or known hereditary cancer syndromes (Shaukat et al., 2021; Qaseem et al., 2023; Thomas et al., 2025).

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CTC has demonstrated comparable sensitivity and specificity to colonoscopy for the detection of clinically significant polyps, while offering a minimally invasive alternative that does not require sedation (Thomas et al., 2025; Davidson et al., 2021). However, bowel preparation requirements are similar to those of conventional colonoscopy, and CTC is associated with ionizing radiation exposure. Additionally, because CTC is a diagnostic rather than therapeutic procedure, any detected lesions require follow-up colonoscopy for removal or biopsy (Shaukat et al., 2021; Thomas et al., 2025).

Overall, CTC provides an effective, noninvasive screening option for appropriately selected average-risk individuals, particularly those who are unable or unwilling to undergo colonoscopy (Wolf et al., 2018; Davidson et al., 2021; Thomas et al., 2025).

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Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC); Ascites and Portal Hypertension (AB-26)

Guideline

Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)
Ascites (AB-26.2)
Portal Hypertension (AB-26.3)
Monitoring After Fontan Procedure (AB-26.4)
References (AB-26)

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Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)

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Criteria

HCC Screening and Surveillance

- Ultrasound (CPT® 76700 or CPT® 76705) every 6 months for HCC screening is considered medically necessary in ANY of the following circumstances:
  - All individuals, regardless of etiology, with cirrhosis or advanced fibrosis (e.g., Fibrosis Score F3 or greater on an elastography study, or results of a lab study such as FIB-4 or a biopsy indicative of severe activity or advanced fibrosis).
  - All individuals with Hepatitis B, regardless of the presence of cirrhosis or advanced fibrosis.
- See: **Hepatic Arteries and Veins (AB-43.1)** for individuals with Chronic Budd-Chiari Syndrome (BCS) and HCC surveillance in Budd-Chiari Syndrome/Hepatic Vein Thrombosis.
- See: **Monitoring After Fontan Procedure (AB-26.4)** for individuals who have undergone the FONTAN procedure.
- See: **General Guidelines (AB-1.0)** for use of medications or treatments which increase risk of HCC.

Evaluation of Liver Nodules

- If liver nodule is identified in the setting of chronic liver disease:
  - Less than 1cm
    - Repeat US in 3 months, then every 3 to 6 months
    - If stable for 2 years, return to US every 6 months
  - Greater than or equal to 1cm
    - Multiphase CT Liver (either CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) should be performed.
      - If negative: Return to routine surveillance US in 6 months.
      - If Li-RADS NC (non-categorizable): Repeat the same study or an alternative diagnostic imaging in 3 months or less.
      - If Li-RADS 1 (definitely benign): Return to routine surveillance US in 6 months.

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  - If Li-RADS 2 (probably benign): CT or MRI in 6 months can be approved (US requests are approvable if desired). If unchanged, return to routine surveillance US.
  - If Li-RADS 3 (intermediate): CT or MRI in 3-6 months, and can be repeated every 6 months 2 more times, for a total of 18 months from the initial finding. If no change by 18 months, return to US surveillance every 6 months.
  - If Li-RADS 4 (probable HCC): Repeat the same study or alternative imaging in 3 months or less. If HCC confirmed: See: **Upper GI Cancers (ONC-14)** in the Oncology Imaging Guidelines.
  - If Li-RADS 5 (HCC confirmed): See: **Upper GI Cancers (ONC-14)** in the Oncology Imaging Guidelines.
  - If Li-RADS M (Malignant, not definitely HCC): Repeat the same study or alternative imaging in 3 months or less, and follow appropriate Oncology guidelines upon diagnosis.

- Exceptions to the above algorithms:
  - Advanced imaging (Multiphase CT Liver (either CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) for surveillance may be substituted for US in the following circumstances:
    - Obesity (BMI greater than 35 kg/m²)
    - Marked parenchymal heterogeneity (suggestive of advanced liver fibrosis) noted on US
    - Visualization limitations noted on US which could be technical (such as obscuration by intestinal gas, chest wall deformity, etc.), or those related to structural or parenchymal changes in the liver
  - For individuals on the Liver Transplant list: See: **Liver Transplant, Pre-Transplant (AB-42.1)**
  - For Magnetic Resonance Elastography (MRE) indications, see: **Liver Elastography (AB-45)**
- For an Alpha-fetoprotein level of 20 ng/mL or greater:
  - Multiphasic CT or MRI Abdomen is considered medically necessary
  - Further imaging should follow the above Li-RADS algorithm, depending on the findings of the CT or MRI.
  - If the initial CT or MRI does not reveal a lesion, but the AFP increases on subsequent testing, repeat CT or MRI may be considered medically necessary.
- Contrast-Enhanced Ultrasound (CEUS)
  - Further studies are needed to assess the value of CEUS in this setting, and it is considered not medically necessary at this time.

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Background and Supporting Information

The American Association for the Study of Liver Diseases (AASLD) recommends HCC surveillance in at-risk individuals using ultrasound with or without alpha-fetoprotein (AFP) (Singal et al., 2023).

The Liver Imaging Reporting and Data System (LI-RADS) is the standardized imaging classification system endorsed by the AASLD for reporting liver observations in individuals at risk for HCC (American College of Radiology, 2023; Singal et al., 2023).

LI-RADS categories include (American College of Radiology, 2023):

- LI-RADS NC: Non-categorizable observation due to technical limitations or inadequate imaging quality.
- LI-RADS 1: Definitely benign.
- LI-RADS 2: Probably benign.
- LI-RADS 3: Intermediate probability of malignancy.
- LI-RADS 4: Probably HCC.
- LI-RADS 5: Definitely HCC.
- LI-RADS M: Malignant but not specific for HCC.

Primary sclerosing cholangitis (PSC) is a chronic cholestatic liver disease characterized by inflammation and fibrosis of the intrahepatic and extrahepatic bile ducts, resulting in multifocal strictures and segmental dilatation that may produce a beaded appearance on cholangiographic imaging (Bowlus et al., 2023).

Primary biliary cholangitis (PBC) is an autoimmune cholestatic liver disease characterized by progressive destruction of the small intrahepatic bile ducts and is commonly associated with antimitochondrial antibodies (Lindor et al., 2022).

Evidence Discussion

Ultrasound is the standard modality for hepatocellular carcinoma (HCC) surveillance in individuals with cirrhosis or advanced fibrosis due to its safety, accessibility, and ability to support longitudinal monitoring. It avoids ionizing radiation and can be repeated at six-month intervals, which aligns with the tumor doubling time of HCC and improves the likelihood of detecting early-stage disease (Singal et al., 2023). For this reason, AASLD recommends semiannual ultrasound, with or without alpha-fetoprotein (AFP), in all at-risk individuals, independent of underlying etiology.

The National Comprehensive Cancer Network (NCCN) recommends hepatocellular carcinoma (HCC) surveillance for individuals with chronic hepatitis B infection even in the absence of cirrhosis, regardless of fibrosis stage. The NCCN HCC screening algorithm specifically identifies individuals with chronic hepatitis B without cirrhosis as a risk group that should be enrolled in an HCC surveillance program (NCCN, 2025).

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Recommended surveillance consists of liver ultrasound and alpha-fetoprotein (AFP) testing every 6 months (NCCN, 2026).

Additional factors that may further support HCC surveillance among non-cirrhotic individuals with hepatitis B include a PAGE-B score of ≥10, a family history of HCC, men from hepatitis B endemic regions who are older than 40 years, women from endemic regions who are older than 50 years, and individuals from Africa, who may warrant surveillance at an earlier age (NCCN, 2026).

The NCCN Principles of Imaging note that HCC screening and surveillance are considered cost-effective in individuals with chronic hepatitis B, even in the absence of cirrhosis. Furthermore, individuals with viral hepatitis who have achieved a complete or sustained viral response should continue to undergo HCC surveillance because their risk is not completely eliminated (NCCN, 2026).

The diagnostic pathway following nodule detection is driven primarily by lesion size and growth dynamics. Sub-centimeter lesions have a low probability of representing clinically significant HCC and are not reliably characterized with cross-sectional imaging. Multiphase CT and contrast-enhanced MRI lack sufficient sensitivity and specificity in lesions less than 1 cm, largely due to limited visualization of arterial phase enhancement and washout in very small nodules. As a result, short-interval follow-up with ultrasound and AFP at 3 to 6 months is recommended to detect interval growth or evolution of imaging features (Singal et al., 2023).

In contrast, lesions measuring 1 cm or greater warrant diagnostic evaluation with multiphase CT or contrast-enhanced MRI. At this threshold, imaging can reliably assess hallmark vascular features of HCC, including arterial phase hyperenhancement and delayed washout. These features allow for noninvasive diagnosis using standardized criteria, most commonly operationalized through the LI-RADS framework (Singal et al., 2023; American College of Radiology, 2023). LI-RADS categories stratify malignancy probability and guide management, including short-interval follow-up for indeterminate lesions (LR-3), expedited imaging for probable HCC (LR-4), and treatment referral for definite HCC (LR-5). This structured approach supports the tiered management outlined in your criteria.

While CT and MRI demonstrate higher sensitivity for early HCC detection in some studies, particularly in Asian hepatitis B cohorts, these findings have limited applicability to broader Western populations. Concerns regarding cumulative radiation exposure with CT and the cost, access, and contrast-related constraints of MRI limit their routine use for surveillance. AASLD therefore supports reserving cross-sectional imaging for diagnostic clarification rather than primary screening (Kim et al., 2019; Singal et al., 2023).

Ultrasound performance may be reduced in individuals with obesity, parenchymal heterogeneity, or limited acoustic windows. In such cases, substitution with CT or MRI

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for surveillance is reasonable, as visualization limitations directly impair detection sensitivity. This exception is consistent with guideline-based acknowledgment that surveillance effectiveness depends on adequate image quality (Singal et al., 2023).

AFP serves as a complementary biomarker in this framework. Marked elevation, particularly values ≥20 ng/mL or rising trends, increases pretest probability of HCC and justifies diagnostic imaging even in the absence of a discrete ultrasound finding. When cross-sectional imaging remains negative, continued AFP elevation may prompt repeat CT or MRI, reflecting the limitations of single time-point imaging in detecting early or infiltrative disease (Singal et al., 2023).

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Ascites (AB-26.2)

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Criteria

- Abdominal ultrasound (CPT® 76700 or CPT® 76705) and/or Doppler (CPT® 93975) with diagnostic paracentesis is required for all initial evaluations of ascites to determine the need for further or advanced imaging.
  - Further advanced imaging is determined by the nature of etiology of the ascites (e.g., portal hypertension secondary to cirrhosis, malignancy such as ovarian or pancreatic, heart failure, etc.).
- Peritoneal-venous shunt patency study (CPT® 78291) is considered medically necessary for evaluation of shunt patency and function in an individual with ascites.

Background and Supporting Information

Guidance from the American Association for the Study of Liver Diseases (AASLD) recommends that the initial evaluation of individuals with ascites include a comprehensive medical history, physical examination, laboratory studies (including complete blood count, liver function tests, and serum and urine electrolytes), abdominal ultrasound with Doppler, and diagnostic paracentesis with ascitic fluid analysis (Biggins et al., 2021; Runyon, 2021). The AASLD specifically recommends that diagnostic paracentesis be performed in all individuals with new-onset ascites that is accessible for sampling (Biggins et al., 2021; Runyon, 2021).

Similarly, European Association for the Study of the Liver (EASL) guidelines emphasize abdominal ultrasound as part of the first-line evaluation to confirm the presence of ascites and assess for underlying liver disease and portal hypertension (European Association for the Study of the Liver [EASL], 2018). These guidelines also support routine diagnostic paracentesis in new-onset ascites to determine etiology and guide subsequent management (Aithal et al., 2020; EASL, 2018).

Evidence Discussion

Ultrasound is highly sensitive for detecting ascitic fluid and is capable of identifying small volumes, making it the most effective initial imaging modality for suspected ascites (EASL, 2018; Moore & Wong, 2019).

Doppler ultrasound further improves diagnostic evaluation by assessing portal and hepatic venous flow, which is critical in identifying portal hypertension as an underlying cause of ascites (EASL, 2018; Garcia-Tsao et al., 2017; Kaplan et al., 2024). Diagnostic paracentesis with ascitic fluid analysis remains essential for distinguishing etiologies

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such as portal hypertension, malignancy, and infection, which subsequently directs further imaging and management (Biggins et al., 2021; Runyon, 2021).

Additional imaging is guided by findings from the initial evaluation. Computed tomography (CT) is useful for identifying malignancy, peritoneal disease, or complications of cirrhosis when clinically indicated (Aithal et al., 2020; EASL, 2018). Echocardiography is appropriate when cardiac etiologies, such as heart failure, are suspected contributors to ascites (Moore & Wong, 2019).

For individuals with refractory ascites who have undergone peritoneovenous shunt placement (e.g., LaVeen shunt), nuclear medicine peritoneovenous shunt studies provide a reliable method for evaluating shunt patency and function (Runyon, 2021).

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Portal Hypertension (AB-26.3)

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Criteria

- In evaluating the cause of portal hypertension:
  - Abdominal US (CPT® 76700 or CPT® 76705) and/or Duplex Doppler US [CPT® 93975] of the liver and upper abdomen is considered medically necessary to distinguish ANY of the following:
    - pre-hepatic causes (including portal vein thrombosis, extrinsic compression from a tumor)
    - intrahepatic causes (including cirrhosis)
    - post-hepatic (including hepatic vein thrombosis)
- CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary for ANY of the following indications:
  - Ultrasound is technically limited in assessing hepatic and/or portal vessels
  - Suspicion of portal vein thrombosis, cavernous transformation, or extrinsic impression, but ultrasound was indeterminate
  - Portal hypertension along with secondary signs are present (including splenomegaly or porto-systemic collaterals)
  - Recurrent (2 or more episodes in the preceding 6 months) or persistent hepatic encephalopathy despite appropriate medical treatment, in individuals with cirrhosis or portal hypertension
- For TIPS (transjugular intrahepatic portosystemic shunt)
  - See: **Hepatic Arteries and Veins (AB-43.1)**

Background and Supporting Information

Portal hypertension is categorized based on the anatomical location of increased resistance to portal blood flow: pre-hepatic (e.g., portal vein thrombosis, extrinsic compression), intrahepatic (most commonly cirrhosis), and post-hepatic (e.g., hepatic vein thrombosis) (de Franchis et al., 2022; Kaplan et al., 2024). Cirrhosis accounts for the majority of portal hypertension cases.

Cirrhosis is a histologic diagnosis; however, the term compensated advanced chronic liver disease (cACLD) is used to describe a spectrum of advanced fibrosis and cirrhosis that may be difficult to distinguish clinically due to limited or absent symptoms (de Franchis et al., 2022). Progression to decompensated advanced chronic liver disease (dACLD) is defined by the development of complications such as ascites, hepatic

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encephalopathy, or gastroesophageal varices (de Franchis et al., 2022; Kaplan et al., 2024).

The development of gastroesophageal varices and associated hemorrhage represents one of the most clinically significant complications of portal hypertension (Garcia-Tsao et al., 2017; Kaplan et al., 2024).

The gold standard for assessing portal hypertension is measurement of the hepatic venous pressure gradient (HVPG), defined as the pressure gradient between the portal vein and inferior vena cava; however, this requires invasive testing (de Franchis et al., 2022; Kaplan et al., 2024). Clinically significant portal hypertension (CSPH) is defined as HVPG greater than 10 mm Hg (de Franchis et al., 2022).

Non-invasive approaches are recommended for risk stratification in individuals with suspected cACLD. Current consensus guidance supports combining liver stiffness measurement (LSM), typically obtained via transient elastography, with platelet count to stratify the risk of CSPH and guide further evaluation (de Franchis et al., 2022; Kaplan et al., 2024).

Evidence Discussion

Initial evaluation of suspected portal hypertension includes clinical assessment supported by imaging to evaluate hepatic structure and vascular flow. Ultrasound with Doppler provides critical information regarding liver morphology, portal vein patency, and alterations in hepatic and portal venous flow, and is widely used as the first-line imaging modality due to its accessibility and lack of ionizing radiation (Berzigotti et al., 2021; de Franchis et al., 2022; Kaplan et al., 2024).

Cross-sectional imaging with computed tomography (CT) or magnetic resonance imaging (MRI) provides additional diagnostic value when ultrasound findings are inconclusive or when evaluation for complications such as malignancy, thrombosis, or advanced cirrhosis is required (Augustine et al., 2023; Garcia-Tsao et al, 2017; Kaplan et al., 2024). Selection of imaging modality should consider individual factors including pregnancy, contrast exposure risks, cost, and individual tolerance.

Surrogate markers of clinically significant portal hypertension (CSPH) include the presence of gastroesophageal varices or portosystemic collaterals on imaging (de Franchis et al., 2022; Kaplan et al., 2024). In the absence of these findings, invasive testing such as HVPG measurement or liver biopsy may be required for definitive diagnosis; however, these approaches are increasingly reserved for cases of diagnostic uncertainty (de Franchis et al., 2022).

Non-invasive modalities have demonstrated strong correlation with portal hypertension severity. Transient elastography (TE) provides quantitative liver stiffness measurement (LSM), which correlates with the degree of fibrosis and risk of CSPH (Berzigotti et al., 2021). More refined risk stratification models integrating LSM with platelet count have

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been developed and validated to predict CSPH and the presence of high-risk varices (de Franchis et al., 2022; Kaplan et al., 2024).

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Monitoring After Fontan Procedure (AB-26.4)

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Criteria

- Abdominal ultrasound (CPT® 76700 or CPT® 76705) and Doppler (CPT® 93975) are considered medically necessary every 6 months or per institution protocol.
- MR Elastography (CPT® 76391) is considered medically necessary every 6 months
- If any sized lesions are detected on ultrasound:
  - MRI Abdomen without contrast (CPT® 74181) or MRI Abdomen without and with contrast (CPT® 74183) with follow-up timeframes as requested.
- If advanced fibrosis or cirrhosis is detected on any imaging modality:
  - HCC monitoring every 6 months after advanced fibrosis or cirrhosis is detected with MRI Abdomen without contrast (CPT® 74181) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary.
- CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen with contrast (CPT® 74160), or other elastography techniques (i.e., Fibroscan) can be used to assess and monitor individuals with contraindications to MRI (e.g., pacemaker devices, etc.).

Evidence Discussion

Fontan physiology produces chronic venous hypertension and reduced hepatic perfusion, leading to progressive fibrosis, cirrhosis, and an increased risk of hepatocellular carcinoma (HCC) (Emamaullee et al., 2020; Hilscher & Kamath, 2023). Disease progression is often clinically silent, which supports structured, longitudinal surveillance.

Ultrasound with Doppler remains an accessible first-line modality for routine monitoring of hepatic morphology and hemodynamics. However, its sensitivity is limited in Fontan-associated liver disease (FALD) due to heterogeneous parenchymal changes and congestion. As fibrosis advances, cross-sectional imaging becomes necessary for improved lesion detection and characterization. MR-based techniques, including MR elastography, provide noninvasive quantification of liver stiffness and are useful for tracking fibrosis progression over time (Jarasvaraparn et al., 2026).

Lesion detection in FALD requires a low threshold for MRI. The altered hepatic vascular environment disrupts typical enhancement patterns used to diagnose HCC, particularly the expected delayed washout. As a result, imaging findings may be indeterminate, and

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LI-RADS criteria are less reliable in this population (Chavhan et al., 2021; Hilscher & Kamath, 2023). MRI, with or without contrast, is therefore appropriate when ultrasound identifies any lesion, regardless of size, to allow multiphasic evaluation.

Once advanced fibrosis or cirrhosis is identified, semiannual HCC surveillance is warranted, consistent with general HCC screening principles, though applied with recognition of reduced imaging specificity in FALD (Benson et al., 2024; Emamaullee et al., 2020; Téllez et al., 2023). MRI is preferred for surveillance due to its higher sensitivity in detecting small or atypical lesions. When MRI is contraindicated, CT or alternative elastography methods provide reasonable substitutes, though with known limitations in lesion characterization and fibrosis assessment.

Given the absence of standardized society guidelines specific to FALD, current practice reflects expert consensus and institutional protocols. These approaches emphasize early detection, multimodality imaging, and escalation to advanced imaging or biopsy when findings are indeterminate (Jarasvaraparn et al., 2026; Emamaullee et al., 2020; Téllez et al., 2023). The proposed criteria are consistent with this framework and appropriately integrate surveillance intervals, modality selection, and contingency pathways based on imaging findings and patient-specific constraints.

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MR Cholangiopancreatography (MRCP) (AB-27)

Guideline

MRCP (AB-27.1)
References (AB-27)

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MRCP (AB-27.1)

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Criteria

- MRCP (Magnetic Resonance Cholangiopancreatography) is a non-invasive imaging procedure, which is used to visualize the biliary and pancreatic ductal system. It is used most often in the following circumstances:
  - Suspected gallstone pancreatitis (See: **Pancreatitis (AB-33)**)
  - Suspected biliary pain (See: **Right Upper Quadrant and Epigastric Pain (AB-2.3)**
  - Pancreatic cyst and pseudocyst evaluation (See: **Pancreatic Lesion (AB-31)**, and **Pancreatitis (AB-33)**)
  - Choledochal cyst surveillance (See: **Biliary Disease PEDAB-16.2**)
  - Evaluation of abnormal liver chemistries (See: **Abnormal Liver Chemistries (AB-30.1)**)
  - Evaluation of the pancreas secondary to abdominal trauma with suspected duct injury or pseudocyst
  - Recurrent pancreatitis of unknown etiology (See: **Pancreatitis (AB-33)**)
  - Evaluation and follow-up of Primary Sclerosing Cholangitis (See: **Primary Sclerosing Cholangitis (PSC) (AB-23.4)**)
  - Evaluation of jaundice (See: **Abnormal Liver Chemistries (AB-30.1)**)
  - Evaluation of congenital anomalies of the cystic and hepatic ducts
  - Post-surgical biliary anatomy and complications (See: **Liver Transplant, Post-Transplant Imaging (AB-42.3)**)
  - For further evaluation of ultrasound or CT findings of abnormally dilated biliary duct, dilated pancreatic duct, or enlargement or fullness of the pancreas.
- Code assignment for MRCP
  - In general, there is no specific CPT code to describe MRCP. To report an MRCP, one of the MRI Abdomen codes should be selected, depending on contrast needs (CPT® 74181, CPT® 74182, or CPT® 74183). There is also a level II HCPCS code for MCRP, S8037; however simultaneous billing of any of these codes is redundant and unnecessary.
  - Reporting or billing a *second* MRI code to represent the “MRCP portion” of the study is not supported. When this occurs, it is usually seen as two simultaneous MRI requests, an MRI Abdomen without and with contrast (CPT® 74183) AND an additional MRI Abdomen without contrast (CPT® 74181). This second MRI code, as noted, is not supported. Both the primary MRI Abdomen AND the MRCP portion of the study are covered by the single MRI Abdomen code (CPT® 74183).

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- Requests for 3D rendering (either CPT® 76376 or CPT® 76377) are approvable, if requested, in addition to the primary MRI Abdomen code (CPT® 74181, CPT® 74182, or CPT® 74183).

Evidence Discussion

Magnetic resonance cholangiopancreatography (MRCP) is a noninvasive MRI technique used to visualize the biliary and pancreatic ductal systems. It employs heavily T2-weighted sequences to highlight static fluid, allowing clear delineation of ductal anatomy without ionizing radiation or endoscopic instrumentation (American College of Radiology [ACR], 2023; Manfredi et al., 2020).

MRCP is appropriate when ductal pathology is suspected or when prior imaging is inconclusive. Common indications include suspected gallstone pancreatitis, biliary-type pain, pancreatic cysts and pseudocysts, and choledochal cyst surveillance. It is also used in the evaluation of abnormal liver chemistries, jaundice, recurrent pancreatitis of unclear etiology, and suspected ductal injury following abdominal trauma. Additional applications include assessment of primary sclerosing cholangitis, congenital biliary anomalies, post-surgical biliary anatomy, and further characterization of ductal dilation or pancreatic abnormalities identified on ultrasound or CT (Dumonceau et al., 2019; Manfredi et al., 2020; Tenner et al., 2024).

Evidence supports MRCP as a first-line diagnostic modality for many pancreaticobiliary conditions due to its accuracy in detecting ductal obstruction and choledocholithiasis. Current practice places MRCP prior to endoscopic retrograde cholangiopancreatography (ERCP), reserving ERCP for therapeutic intervention. MRCP and endoscopic ultrasound (EUS) are complementary, with MRCP providing ductal mapping and EUS offering higher sensitivity for small stones (American Society for Gastrointestinal Endoscopy, 2019; Dumonceau et al., 2019).

Limitations include longer acquisition times, motion sensitivity, and variable availability (ACR, 2023; Granata et al., 2021). Safety concerns relate to gadolinium-based contrast when used. Gadolinium retention has been observed, though no confirmed clinical harm has been established in individuals with normal renal function. Risk remains relevant in severe renal impairment (ACR, 2023; ESUR Contrast Media Safety Committee, 2025; McDonald et al., 2018).

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Gallbladder (AB-28)

Guideline

Gallbladder (AB-28.1)
References (AB-28)

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Gallbladder (AB-28.1)

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Criteria

- Findings on ultrasound or endoscopic ultrasound (EUS) suspicious for malignancy:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170)
- Findings on ultrasound inconclusive for adenomyomatosis:
  - Contrast-Enhanced US (CEUS, CPT® 76978, CPT® 76979)
    - If US and CEUS are inconclusive for adenomyomatosis:
      - MRI Abdomen without and with contrast (CPT® 74183)
- For confirmed gallbladder malignancy:
  - See **Gallbladder and Biliary Tumors - Initial Work-up/Staging (ONC-14.6)** in the Oncology Imaging Guidelines

Gallbladder Polyps

- Individuals at increased risk for gallbladder malignancy (if surgery not chosen):
  - Age greater than 50 years old
  - Primary Sclerosing Cholangitis (PSC)
  - Indian ethnicity
  - Sessile polyp or gallbladder wall thickening greater than 4mm
- Increased risk for gallbladder malignancy:
  - Polyp less than 6 mm
    - Ultrasound at 6 months, then yearly for 5 years
  - Polyp 6-9 mm (If cholecystectomy is not chosen)
    - Ultrasound at 6 months, then yearly for 5 years
- No increased risk for gallbladder malignancy:
  - Polyp less than 6 mm
    - Ultrasound at 1, 3, and 5 years
  - Polyp 6-9 mm
    - Ultrasound at 6 months, and then yearly for 5 years
- Gallbladder polyp greater than or equal to 10 mm:
  - Surgery recommended.
  - If surgery is not performed, follow guidelines for individuals at increased risk for gallbladder malignancy as noted above.

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Background and Supporting Information

Transabdominal ultrasound is the preferred first-line imaging modality for the detection, characterization, and surveillance of gallbladder polyps. Endoscopic ultrasound (EUS) may provide additional lesion characterization in selected individuals when further evaluation is needed. Current evidence and guideline recommendations do not support routine use of CT or MRI before conventional ultrasound in the initial investigation of gallbladder polyps. Cross-sectional imaging is generally reserved for indeterminate findings or suspicion of malignancy (Foley et al., 2022; Wiles et al., 2017).

Evidence Discussion

Transabdominal ultrasound is the primary modality for detection and surveillance of gallbladder polyps due to its diagnostic adequacy for size measurement and morphologic assessment, which are the key determinants of malignancy risk (Foley et al., 2022; Wiles et al., 2017). Longitudinal stability, particularly over a five-year interval, is used as a surrogate for benign behavior, which underpins surveillance-based management strategies.

Guideline recommendations support risk-stratified follow-up based on polyp size and individual factors. Increased malignancy risk is associated with age above 50, primary sclerosing cholangitis, and sessile morphology. Growth, particularly increases exceeding 2 mm, is also considered clinically meaningful, reflecting either true progression or measurement variability beyond expected limits (European Society of Gastrointestinal Endoscopy et al., 2022; Foley et al., 2022).

Advanced imaging modalities are not recommended for routine surveillance because they do not improve detection or risk stratification of small polyps. Their role is reserved for problem-solving. CT is appropriate when malignancy is suspected, as it enables evaluation of local invasion, lymphadenopathy, and biliary obstruction, all of which inform staging and management decisions (Foley et al., 2022; McCain et al., 2018).

For adenomyomatosis, ultrasound remains the preferred modality due to its ability to demonstrate characteristic features such as intramural cystic spaces and comet-tail artifacts. High-frequency probe selection and focal depth optimization allow reliable identification in most cases. MRI is reserved for indeterminate cases where ultrasound and CEUS do not adequately distinguish benign hyperplastic changes from neoplastic processes (Bonatti et al., 2017; Golse et al., 2017).

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Liver Lesion Characterization (AB-29)

Guideline

Liver Lesion Characterization (AB-29.1)
Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), Formerly Known as NAFLD) (AB-29.2)
Polycystic Liver Disease (AB-29.3)
Isolated or Incidental Hepatomegaly (AB-29.4)
References (AB-29)

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Liver Lesion Characterization (AB-29.1)

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Indeterminate Liver Lesions Criteria

- **Indeterminate liver lesion discovered on US:**
  - Indeterminate liver lesion measuring 1cm or greater on initial imaging
    - No suspicion or evidence of extrahepatic malignancy or underlying liver disease:
      - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) or Contrast-Enhanced US (CEUS, CPT® 76978, CPT® 76979)
    - Known history of an extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170)
    - Known history of chronic liver disease:
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
  - Indeterminate liver lesion measuring less than 1cm on initial imaging
    - Known underlying chronic liver disease
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
    - Known history of an extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183) is the preferred study.
      - Contrast-Enhanced US (CPT® 76978, CPT® 76979) is appropriate.
- **Indeterminate liver lesion discovered on non-contrast CT or non-contrast MRI**
  - Liver lesion on initial imaging
    - No suspicion or evidence of extrahepatic malignancy or underlying liver disease
      - Multiphase CT Abdomen with contrast (CPT® 74160), MRI Abdomen without and with contrast (CPT® 74183), or CEUS (CPT® 76978 and/or CPT® 76979)
    - Known history of extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183), CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170), or CEUS (CPT® 76978 or CPT® 76979)
    - Known chronic liver disease:
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
- Additional scenarios and follow-up imaging for an indeterminate lesion in an individual based on risk factors:
  - Low risk individuals defined as:
    - No known primary malignancy

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        - No hepatic dysfunction (abnormal liver tests)
        - No underlying chronic liver disease
        - No history of alcoholism, sclerosing cholangitis, choledochal cysts, hemochromatosis, or anabolic steroid use
    - High risk individuals would have ONE or MORE of the above conditions.
    - Indeterminate lesion measuring less than 1cm on US, CT, or MRI, **low-risk** individual and no suspicious imaging features noted on the study
        - No further imaging
    - Indeterminate lesion measuring less than 1cm in **high-risk** individuals on US, CT, or unenhanced MRI not specifically dealt with in the above guidelines:
        - MRI Abdomen without and with contrast (CPT® 74183)
        - If, after MRI, the lesion remains indeterminate or not fully characterized
            - See: **Liver Metastases (ONC-31.2)** or malignancy-specific guidelines in the Oncology Imaging Guidelines.
            - If biopsy cannot be performed, follow-up MRI can be obtained in 3-6 months. Additional imaging in this setting can be considered on an individual basis. This timeframe would also apply if the lesion is indeterminate and an MRI with Eovist is requested for further evaluation in this setting.
    - Most lesions measuring 1cm or greater can be categorized by MRI or histology. For lesions which have been categorized, regardless of size, see below.

Focal Liver Lesions Criteria

- For the imaging of specific focal liver lesions:
    - **Suspected hepatic adenoma**:
        - MRI is considered the best technique for characterization.
        - Follow-up imaging can be CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) every 6 months for 2 years, and then annually, to establish any growth patterns and assess for malignant transformation.
    - **Hepatic Hemangioma (if not completely characterized on initial CT without a liver protocol):**
        - Multiphase CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183)
        - Follow-up imaging is considered medically necessary as follows:
            - In individuals with cirrhosis or chronic hepatitis B, continued imaging with multiphase CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) every 3-6 months for one year.

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- For continued HCC surveillance after one year, see also: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)**
- Giant hemangiomas (greater than 4cm) can be followed by limited abdominal US in 6-12 months. If no change in size, no further follow-up is indicated, unless it becomes symptomatic.
- See below for pre-operative considerations

◦ **Focal Nodular Hyperplasia (FNH):**
- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) to confirm a diagnosis of FNH. The use of Eovist contrast is often diagnostic in differentiating FNH from other lesions seen on MRI or CT.
- Additional follow-up is annual US for 2 to 3 years in women diagnosed with FNH who are continuing to use oral contraceptives. Follow-up with CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) can be done if the lesion is not adequately visualized on US.

◦ **Hepatic cysts**:
- Asymptomatic, simple cysts do not require additional follow-up.
- For complicated cysts (US shows internal septations, fenestrations, calcifications, irregular walls, as well as the presence of daughter cysts):
- CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) can be performed

- **Additional indications for advanced imaging (MRI Abdomen or CT Abdomen)**:
◦ If documented that a percutaneous liver biopsy is to be considered if imaging is atypical or inconclusive.
◦ Fatty liver (hepatic steatosis) on US with a focal liver lesion.
◦ **If there is a technical limitation to US (e.g., marked heterogeneity, or other specifically noted technical limitations of US such as obscuration by intestinal gas, chest wall deformity, etc.)
◦ For suspected liver metastases, see: **Liver Metastases (ONC-31.2)** in the Oncology Imaging Guidelines

- Preoperative studies for individuals with large hemangiomas or adenomas considered for resection:
◦ MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) can be considered

- For indeterminate lesions measuring 1cm or greater in categories for which defined guidelines do not exist (i.e., underlying chronic liver disease, **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**, underlying malignancy, **Liver Metastases (ONC-31.2)** or the specific malignancy in the Oncology Imaging

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Guidelines, hepatic adenoma, etc.) a biopsy should be considered when the findings from advanced imaging are inconclusive. In clinical situations when a biopsy cannot be performed (such as a medical contraindication or a liver transplant candidate due to the risk of needle-tract seeding), or is inconclusive, a short-term surveillance MRI can be performed in 3-4 months to monitor lesion stability.

- This can be repeated every 6 months, as necessary in this scenario. This timeframe would also apply if an MRI with Eovist is requested for short-term follow-up of an indeterminate lesion imaged on MRI Abdomen without and with contrast performed with other contrast, such as gadolinium. An exception would be if the differential is between FNH vs. hepatic adenoma or other benign lesions. FNH follow-up is yearly, and hepatic adenoma would require a 6 month follow-up study; if the differential of the lesion is between FNH and hepatic adenoma, then the follow-up study should be 6 months.
- Nuclear Medicine imaging of the Liver (CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215, CPT® 78216, or CPT® 78830) is rarely performed, but can be considered medically necessary when US, CT, and MRI are unavailable or contraindicated for:
  - evaluation of liver mass, trauma, or suspected focal nodular hyperplasia (FNH)
  - differentiation of hepatic hemangioma from FNH
  - diffuse hepatic disease or elevated liver function tests

Background and Supporting Information

An indeterminate liver lesion is a focal hepatic abnormality that cannot be definitively classified as benign or malignant on initial imaging evaluation. Lesions measuring 1 cm or greater are generally considered clinically significant because they may require additional diagnostic evaluation to establish etiology and guide management (Chernyak et al., 2020).

Advanced imaging approvals in this section refer to MRI Abdomen without and with contrast (CPT® 74183), CT Abdomen with contrast (CPT® 74160), CT Abdomen without and with contrast (CPT® 74170), and Contrast-Enhanced Ultrasound (CEUS) (CPT® 76978 for the initial lesion and CPT® 76979 for additional lesions).

When only CT Abdomen with contrast (CPT® 74160) is identified as the appropriate study, this reflects American College of Radiology appropriateness recommendations indicating that a preceding non-contrast CT examination does not provide additional diagnostic benefit for characterization of most indeterminate liver lesions. Additionally, a standard multiphasic (triple-phase) CT examination of the liver does not routinely require a pre-contrast acquisition (Chernyak et al., 2020).

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Evidence Discussion

CT, MRI, and contrast-enhanced ultrasound (CEUS) are established imaging modalities for the characterization of focal liver lesions. Selection among these modalities depends on lesion size, imaging appearance, patient-specific factors, and the diagnostic question being addressed (Frenette et al., 2024).

CT provides high spatial resolution and can accurately characterize many benign and malignant liver lesions. However, lesion characterization may be limited for lesions smaller than 1 cm because the resolution of CT often does not allow definitive characterization of very small lesions (Chernyak et al., 2020; Gore et al., 2017). ACR Appropriateness Criteria further note that, for many clinical scenarios involving indeterminate liver lesions, multiphasic contrast-enhanced CT is appropriate whereas the addition of a non-contrast CT acquisition is generally not associated with improved diagnostic characterization (Chernyak et al., 2020).

MRI provides superior soft tissue contrast and multiparametric tissue evaluation, resulting in greater diagnostic accuracy for characterization of indeterminate liver lesions, particularly small lesions and lesions identified in individuals with a known extrahepatic malignancy. Evidence supports the use of MRI when additional characterization is needed or when distinguishing benign from malignant lesions may impact management (Chernyak et al., 2020; EASL, 2016; Frenette et al., 2024).

CEUS has also emerged as a valuable problem-solving modality for characterization of indeterminate focal liver lesions. The use of intravascular contrast agents allows real-time evaluation of lesion vascularity and enhancement patterns without ionizing radiation, providing diagnostic performance that may be comparable to CT and MRI in selected clinical scenarios (Dietrich et al., 2020; Frenette et al., 2024).

Current guidelines support selection of CT or MRI based on lesion characteristics, clinical context, and prior imaging findings, with MRI generally preferred when characterization of small or indeterminate lesions is required (American College of Radiology, 2024; EASL, 2016; Frenette et al., 2024).

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Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), Formerly Known as NAFLD) (AB-29.2)

AB.LL.0029.2.A
v1.0.2027

Criteria

- Fatty liver (hepatic steatosis) incidentally discovered on imaging (US/CT/MRI) or suspected:
  - Magnetic Resonance Elastography (MRE) (CPT® 76391) may be considered medically necessary if criteria are met, see: **Liver Elastography (AB-45)**
  - The following procedures are considered experimental and investigational for the evaluation of fatty liver disease:
    - Magnetic Resonance-Protein Density Fat Fraction (MRI-PDFF, usually requested as CPT® 74181 or 74183),
    - MR Spectroscopy (MR-S, CPT® 76390), and
    - Multiparametric MRI referred to as Liver Multiscan (LMS, Category III CPT® code 0648T or 0649T)
  - HCC Screening for Fatty Liver with cirrhosis or advanced fibrosis:
    - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
  - MRI or CT for the further evaluation of incidentally discovered fatty liver on US, in the absence of a specific finding needing further characterization such as a nodule, is generally considered not medically necessary. See: **Liver Lesion Characterization and Additional Indications for Advanced Imaging (AB-29.1)**. In addition, the finding of fatty liver alone on CT with contrast does not require MRI for confirmation.
  - Requests for imaging studies to screen individuals at high-risk for MASLD (formerly known as NAFLD) (e.g., diabetes or obesity) or for screening family members of individuals with MASLD is not approvable at this time.

Evidence Discussion

Metabolic dysfunction-associated steatotic liver disease (MASLD), previously known as nonalcoholic fatty liver disease (NAFLD), is the most common cause of hepatic steatosis. While steatosis may be identified incidentally on ultrasound, CT, or MRI, disease severity is driven by the presence of fibrosis, which is the strongest predictor of liver-related outcomes and mortality. Therefore, accurate noninvasive assessment of fibrosis is important for risk stratification and management (Castera et al., 2023;

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European Association for the Study of the Liver [EASL], European Association for the Study of Diabetes [EASD], & European Association for the Study of Obesity [EASO], 2024; Rinella et al., 2023).

Magnetic resonance elastography (MRE) provides a quantitative assessment of liver stiffness and has demonstrated high diagnostic accuracy for detecting and staging hepatic fibrosis. Current American Association for the Study of Liver Diseases (AASLD) guidance recognizes MRE as a valuable noninvasive tool for evaluating fibrosis in individuals with suspected NAFLD/MASLD, particularly when additional characterization of liver disease severity is clinically warranted (Castera et al., 2023; Rinella et al., 2023).

Other MRI-based technologies, including magnetic resonance proton density fat fraction (MR-PDFF), magnetic resonance spectroscopy (MRS), and multiparametric MRI techniques such as LiverMultiScan, have been developed to evaluate hepatic fat content and other tissue characteristics. Although these technologies show promise, current evidence remains insufficient to establish their routine clinical use. Professional society guidance notes limitations including a lack of validated diagnostic thresholds, limited evidence demonstrating improved clinical outcomes or changes in individual management, uncertainty regarding comparative performance, and the need for further large-scale validation studies. As a result, these techniques remain primarily utilized in research settings and clinical trials (Caussy et al., 2018; EASL et al., 2024; National Institute for Health and Care Excellence [NICE], 2019; Rinella et al., 2023).

Current AASLD guidance does not recommend routine imaging-based screening for MASLD in asymptomatic individuals at increased risk, including those with obesity, type 2 diabetes mellitus, or a family history of liver disease. This recommendation reflects insufficient evidence that imaging-based screening improves clinical outcomes, together with concerns regarding cost-effectiveness and downstream resource utilization. Instead, current guidance emphasizes targeted risk assessment using clinical and noninvasive fibrosis evaluation strategies (Chalasani et al., 2018; Rinella et al., 2023).

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Polycystic Liver Disease (AB-29.3)

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Criteria

- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast or without and with contrast (CPT® 74160, CPT® 74170) is considered medically necessary for assessment of liver volume and disease burden in individuals with known or suspected polycystic liver disease when prognostic assessment will impact clinical management.
- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast or without and with contrast (CPT® 74160, CPT® 74170) is considered medically necessary when complications of polycystic liver disease are suspected, including but not limited to:
  - Cyst rupture
  - Cyst hemorrhage
  - Acute upper abdominal pain concerning for cyst-related complication
- Surveillance imaging of asymptomatic individuals is considered not medically necessary.

Background and Supporting Information

Polycystic liver disease (PLD) is generally defined as the presence of greater than 20 hepatic cysts or cysts occupying approximately one-half of the hepatic parenchymal volume (European Association for the Study of the Liver [EASL], 2022; van Aerts et al., 2018).

PLD most commonly occurs as an extrarenal manifestation of autosomal dominant polycystic kidney disease (ADPKD). It may also occur as isolated autosomal dominant polycystic liver disease (ADPLD), a genetically distinct disorder in which cystic liver disease develops in the absence of significant renal involvement. Although both conditions share overlapping clinical and radiologic features, ADPKD represents the most common cause of PLD in clinical practice (EASL, 2022; van Aerts et al., 2018; Wong et al., 2017).

Evidence Discussion

Ultrasound is the preferred initial imaging modality for diagnosing polycystic liver disease because it is highly sensitive for detecting hepatic cysts and assessing cyst burden. In individuals with ADPKD, hepatic cysts represent the most common extrarenal

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manifestation of disease, supporting the use of ultrasound for initial evaluation (Mavilia et al., 2018; Wong et al., 2017; van Aerts et al., 2018).

Current evidence does not support routine surveillance imaging in asymptomatic individuals with PLD. Follow-up imaging is generally reserved for those who develop symptoms, suspected complications, or require treatment planning (EASL, 2022; van Aerts et al., 2018).

MRI and CT provide complementary assessment of liver volume, cyst distribution, and cyst-related complications. Cross-sectional imaging is particularly valuable when complications such as cyst hemorrhage, infection, rupture, or mass effect are suspected. MRI offers superior soft tissue contrast and enhanced characterization of cyst contents, allowing improved detection of hemorrhagic or proteinaceous cysts and more detailed evaluation of complex cystic lesions. These capabilities make MRI particularly useful when ultrasound findings are inconclusive or when detailed preprocedural assessment is required (EASL, 2022; Mavilia et al., 2018).

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Isolated or Incidental Hepatomegaly (AB-29.4)

AB.LL.0029.4.A
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Criteria

- Initial imaging of hepatomegaly discovered or suspected on physical examination:
  - US Abdomen (CPT® 76700 or CPT® 76705) and Duplex (CPT® 93975 or CPT® 93976)
- Further evaluation of abnormalities identified on the initial ultrasound:
  - Refer to specific guidelines for the abnormality detected on US
    - Fatty liver (liver steatosis), see: **Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), formerly known as NAFLD) (AB-29.2)**
    - Hepatic lesion, see: **Liver Lesion Characterization (AB-29.1)**
- Hepatomegaly discovered on ultrasound and no indeterminate abnormalities:
  - Medical workup, including lab studies (e.g., liver function tests), history and physical examination should be performed to assess for suspected underlying disease (e.g., infiltrative disorders such as amyloidosis or lymphoma)
    - Lab abnormalities and/or symptoms of a specific disease process should follow imaging studies outlined in the guideline for that disease process.
    - Advanced imaging in the absence of symptoms or lab abnormalities indicative of an underlying disorder is considered not medically necessary.

Background and Supporting Information

Hepatomegaly is defined as enlargement of the liver and may be detected on physical examination or imaging studies. It is a nonspecific clinical finding that may be associated with a wide range of hepatic and systemic disorders and does not necessarily indicate primary liver disease (Arif-Tiwari et al., 2023).

Potential causes of hepatomegaly include the following (Arif-Tiwari et al., 2023; Mavilia et al., 2018):

- Primary liver disease (e.g., viral hepatitis, alcohol-associated liver disease, metabolic dysfunction-associated steatotic liver disease [MASLD])
- Primary hepatic malignancy or metastatic liver disease
- Infiltrative disorders (e.g., amyloidosis, lymphoma)
- Impaired hepatic venous outflow or systemic venous congestion (e.g., congestive heart failure, Budd-Chiari syndrome)

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- Storage disorders (e.g., Gaucher disease, alpha-1 antitrypsin deficiency)
- Polycystic liver disease

Evidence Discussion

Ultrasound is generally the preferred initial imaging modality for evaluation of hepatomegaly because it can confirm liver enlargement and identify focal or diffuse hepatic abnormalities. When ultrasound findings are indeterminate or suggest a specific underlying process, subsequent CT or MRI may provide additional characterization and guide management (Arif-Tiwari et al., 2023).

Although MRI-based techniques can accurately quantify hepatic fat content, imaging findings alone do not reliably predict the severity of underlying hepatic histopathology. Current evidence and expert guidance indicate that routine quantification of hepatic steatosis has limited value in everyday clinical management (Castera et al., 2023; Rinella et al., 2023).

Advanced imaging is therefore most appropriately guided by specific clinical findings, laboratory abnormalities, or imaging features that suggest an underlying hepatic disorder. The decision to pursue CT, MRI, or other advanced imaging modalities should be based on the suspected etiology of hepatomegaly and the need for additional diagnostic characterization rather than the presence of hepatomegaly alone (Arif-Tiwari et al., 2023; Rinella et al., 2023).

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Abnormal Liver Chemistries (AB-30)

Guideline

Abnormal Liver Chemistries (AB-30.1)
References (AB-30)

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Abnormal Liver Chemistries (AB-30.1)

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Criteria

Elevated AST and/or ALT (greater than 33 IU/l for males [assigned at birth], greater than 25 IU/l for females [assigned at birth]) and other liver function tests (LFTs) are normal or Hepatocellular pattern of elevation (AST and ALT disproportionately elevated to ALKP):

- Less than two times the upper limit of normal (ULN):
  - Repeat lab after 3 weeks and discontinuation of medications associated with elevated LFTs (such as statins, niacin, sulfa, rifampin, tetracycline, estrogen) if applicable.
  - If LFTs remain elevated: Abdominal US (CPT® 76700 or CPT® 76705)
    - Above studies do not explain the cause of the elevated transaminases AND HAV IgG, HBsAg, HBcAb, HBsAb, HCV Ab, iron panel (may include ferritin, serum iron, iron-binding capacity, or transferrin saturation) have been performed and are inconclusive:
      - CT Abdomen with contrast (CPT® 74160)
- Two to fifteen times the upper limit of normal:
  - Abdominal US (CPT® 76700 or CPT® 76705)
    - Above studies do not explain the cause of the elevated transaminases AND HAV IgG, HBsAg, HBcAb, HBsAb, HCV Ab, iron panel (may include ferritin, serum iron, iron-binding capacity, or transferrin saturation) have been performed and are inconclusive:
      - CT Abdomen with contrast (CPT® 74160)
- Greater than fifteen times the upper limit of normal:
  - Abdominal US with Doppler (CPT® 76700 or CPT® 76705 and CPT® 93975) OR
  - CT Abdomen with contrast (CPT® 74160) OR
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - Above studies do not explain the cause of the elevated transaminases AND HAV IgG, HBsAg, HBcAb, HBsAb, HCV Ab, iron panel (may include ferritin, serum iron, iron-binding capacity, or transferrin saturation) have been performed and are inconclusive:

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- MRI Abdomen without and with contrast (CPT® 74183) and/or MRCP (CPT® 74181)

- If the findings suggest chronic liver disease, see: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)**
- If the findings suggest hemochromatosis, see: **Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Disease (AB-11.2)**

Elevated alkaline phosphatase level (or GGT), and other LFTs are normal or cholestatic pattern of elevation (ALKP elevated disproportionately to AST and ALT):

- If isolated alkaline phosphatase (ALKP) elevation, GGT should be obtained for confirmation of hepatic etiology, prior to imaging.
- If ALKP is elevated with other LFTs, no confirmatory test is necessary.
  - Confirmed hepatic etiology of elevated ALKP:
    - Abdominal or RUQ ultrasound (CPT® 76700 or CPT® 76705)
      - Dilated biliary ducts on US:
        - MRCP
    - No dilated biliary ducts on US:
      - Anti-mitochondrial antibody (AMA) should be checked prior to advanced imaging.
        - If AMA testing is negative and ALKP is greater than two times the upper limit of normal:
          - MRCP
        - If AMA testing is negative and the ALKP level is between one and two times the upper limit of normal:
          - observe for 6 months
          - if ALKP remains elevated after 6 months: MRCP
- CT Abdomen with contrast (CPT® 74160) if the above studies are unrevealing or individual cannot undergo MRCP.

Isolated elevated bilirubin (no other LFTs elevated):

- Elevation is unconjugated (elevated indirect bilirubin), and no other LFT elevations:
  - No advanced imaging
- Elevation is conjugated (elevated direct bilirubin)
  - RUQ ultrasound
    - Dilated biliary ducts on ultrasound:

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    - MRCP
  - No dilated biliary ducts on US:
    - Anti-mitochondrial antibody (AMA) should be checked prior to advanced imaging
      - AMA negative and elevation persists or is unexplained:
        - MRCP or liver biopsy
- CT Abdomen with contrast (CPT® 74160) if the above studies are unremarkable or the individual cannot undergo MRCP.

Clinical jaundice, no known predisposing condition:

- Abdominal ultrasound (CPT® 76700 or CPT® 76705)
  - For further imaging, follow guideline for elevated bilirubin
- Clinical jaundice, suspected mechanical obstruction based on clinical condition or laboratory values (e.g., known choledocholithiasis, acute and chronic pancreatitis, suspected stricture from a recent invasive procedure, previous biliary surgery, suspected tumor):
  - CT Abdomen with contrast (CPT® 74160) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)
- US findings suggesting mechanical biliary obstruction, non-diagnostic or technically limited US (e.g., large amounts of intestinal gas, obesity with BMI greater than 35 kg/m²):
  - CT Abdomen with contrast (CPT® 74160) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)

Additional considerations:

- For individuals with elevated LFTs and suspicion of sclerosing cholangitis, such as those with IBD, see: **Primary Sclerosing Cholangitis (PSC) (AB-23.4)**.
- For individuals with elevated LFTs and history of underlying malignancy, please refer to the specific oncology guidelines, when appropriate.
- Requests for additional advanced imaging (CT, MRI, etc.) are based on the prior imaging results, as appropriate to the finding (for example, if a lesion is identified that needs further characterization, refer to liver lesion imaging as per **Liver Lesion Characterization (AB-29.1)**)
- For MRE indications, see: **Liver Elastography (AB-45)**

Background and Supporting Information

- The standard laboratory tests commonly referred to as liver chemistries or liver function tests (LFTs) include bilirubin, alkaline phosphatase (ALKP), aspartate

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aminotransferase (AST), alanine aminotransferase (ALT), and gamma-glutamyl transferase (GGT) (Kwo et al., 2026; Kalas et al., 2021).

- Patterns of liver chemistry abnormalities can help identify the underlying disease process and guide further evaluation (Kwo et al., 2026; Metra et al., 2022):
  - Hepatocellular pattern: AST and ALT are disproportionately elevated compared to ALKP.
  - Cholestatic pattern: ALKP is disproportionately elevated compared with AST and ALT.
  - Mixed pattern: ALKP, AST, and ALT are all elevated without a predominant hepatocellular or cholestatic pattern.
  - Isolated hyperbilirubinemia: Elevated bilirubin with normal AST, ALT, and ALKP.
- "R" Ratio
  - The "R" ratio is used to classify liver chemistry abnormalities as predominantly hepatocellular, cholestatic, or mixed (Kwo et al., 2026; Kalas et al., 2021).
  - R=(ALT/Upper limit of normal (ULN))/(ALKP/ULN ALKP)
    - If the "R" ratio:
      - greater than 5 = hepatocellular
      - less than 2 = cholestatic
      - 2-5 = mixed pattern
  - For hepatocellular, use AST or ALT elevation guidelines
  - For cholestatic, use ALKP elevation guidelines
  - Use ULN for ALT as noted above, and ULN for alkaline phosphatase based on the individual lab report

Evidence Discussion

Abnormal liver chemistries are an important component of the evaluation of suspected liver disease and may reflect hepatocellular injury, cholestasis, impaired hepatic function, or biliary obstruction. Interpretation of abnormal liver chemistries requires consideration of the specific laboratory pattern, degree of abnormality, and clinical context because similar abnormalities may arise from a broad range of hepatic and extrahepatic conditions (Kalas et al., 2021; Kwo et al., 2026).

The pattern and degree of liver chemistry abnormalities help guide further diagnostic evaluation and imaging selection. Clinical practice guidelines recommend that imaging selection be tailored to the specific laboratory abnormality, associated symptoms, and clinical context. Ultrasound is often the preferred initial imaging modality because it can assess hepatic parenchyma, biliary dilation, and other structural abnormalities. CT or MRI may be indicated when ultrasound findings are indeterminate, when a focal hepatic abnormality requires further characterization, or when more comprehensive assessment of the liver and biliary system is needed (Arif-Tiwari et al., 2023; Hindman et al., 2019).

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Current evidence supports integrating liver chemistries with clinical findings, laboratory evaluation, and imaging studies rather than relying on any single diagnostic test. Imaging is most useful when directed by the pattern of abnormal liver chemistries and the suspected underlying etiology. This approach improves diagnostic yield and helps ensure that advanced imaging is used when it is most likely to affect diagnosis, management, or treatment planning (Arif-Tiwari et al., 2023; Kwo et al., 2026; Metra et al., 2022).

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Pancreatic Lesion (AB-31)

Guideline

Pancreatic Cystic Lesions (AB-31.1)
Incidental Pancreatic Mass or Suspected Metastatic Disease to Pancreas (AB-31.2)
References (AB-31)

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Pancreatic Cystic Lesions (AB-31.1)

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Criteria

- **Pancreatic Cyst seen on Imaging-Initial Management**:
  - MRI Abdomen without and with contrast (CPT® 74183) and/or MRCP are the tests of choice for initial evaluation.
    - Both MRI Abdomen and MRCP may be considered medically necessary, but only one CPT® code 74183 should be reported, not two.
  - CT Pancreatic protocol (CPT® 74160) or EUS are alternatives in individuals who are unable to undergo MRI.
  - Indeterminate pancreatic cysts may benefit from a second imaging modality or EUS prior to proceeding with surveillance. MRI/MRCP can be approved to better characterize the lesion, without reference to the timeframe for follow-up imaging, if a previous US or CT Abdomen has been performed.
  - Radiographic diagnosis of a non-neoplastic cyst or classic features of a serous cystadenoma
    - No further imaging
  - If ANY of the following concerning features are present the individual should proceed to EUS with fine-needle aspiration (FNA) and depending on findings, surgical consultation:
    - Main pancreatic duct greater than 5mm
    - Cyst 3cm or greater
    - Change in main duct caliber with upstream atrophy
      - If EUS does not reveal findings of main duct involvement, patulous ampulla, cytology with high-grade dysplasia or pancreatic malignancy, or a mural nodule, then follow up MRI should performed in 6 months.
- **Pancreatic Cyst Follow-up Imaging**:
  - If high risk features (See below High Risk Considerations and Features) are not present, then the next follow-up imaging proceeds as follows:
    - Cyst less than 1cm: MRI in 2 years
    - Cyst 1cm or greater but less than 2cm: MRI in 1 year
    - Cyst 2 to 3cm: if cyst is not clearly an Intraductal papillary mucinous neoplasms (IPMN) or Mucinous cystic neoplasm (MCN) then proceed with EUS. If it is an IPMN or MCN, then MRI at 6-12 months.
    - If the cyst is determined to be a serous cystadenoma, then no further imaging is considered medically necessary unless the individual becomes symptomatic.

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- **Additional Surveillance for a presumed Intraductal papillary mucinous neoplasms (IPMN) or Mucinous cystic neoplasms (MCN) (imaging from time of presentation):**
  - Cyst less than 1cm
    - MRI every 2 years for 4 years
    - If stable after 4 years consider lengthening of interval imaging
    - If increase in cyst size, then MRI or EUS is considered medically necessary in 6 months
    - If stable, repeat imaging in 1 year and if stability persists return to MRI every 2 years
  - Cyst 1cm or greater but less than 2cm
    - MRI yearly for 3 years
    - If stable for 3 years, then change to MRI every 2 years for 4 years
    - If stable after the additional 4 years, consider lengthening of interval for surveillance
    - If increase in cyst size, repeat MRI in 6 months. If stable, repeat MRI in 1 year and if stability persists, resume original surveillance schedule.
  - Cyst 2cm or greater but less than 3cm
    - MRI every 6 to 12 months for 3 years
    - If stable after 3 years, change to MRI every year for 4 years
    - If stability persists, consider lengthening of surveillance interval
  - Cyst measuring 3cm or greater
    - MRI alternating with EUS every 6 months for 3 years
    - If stable for 3 years, increase interval to MRI alternating with EUS yearly for 4 years
    - If stability persists, consider lengthening of surveillance interval
    - If increase in cyst size, EUS with FNA is considered medically necessary
  - Additional considerations
    - Individuals with asymptomatic cysts that are diagnosed as pseudocysts on initial imaging and clinical history, or are determined to be serous cystadenomas, do not require further evaluation.
    - Individuals who are not medically fit for surgery should not undergo further surveillance of incidentally found pancreatic cysts, irrespective of size.
    - Surveillance should be discontinued if an individual is no longer a surgical candidate. However, follow-up imaging can be performed if requested for a symptomatic cyst (such as the development of jaundice secondary to cyst), in which palliative treatment might be available.
    - High-Risk Considerations and Features
      - Individuals with IPMNs or MCNs with new onset or worsening diabetes

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- Rapid increase in cyst size (greater than 3mm/year) during surveillance may have an increased risk of malignancy and should undergo a short-interval MRI or EUS.
- Additional high-risk features which may prompt early evaluation are:
  - jaundice secondary to the cyst
  - acute pancreatitis secondary to the cyst
  - significantly elevated CA 19-9
  - presence of a mural nodule or solid component either within the cyst or in the pancreatic parenchyma
  - dilation of the main pancreatic duct greater than 5mm
  - focal dilation of the pancreatic duct concerning for main duct IPMN or an obstructing lesion
  - IPMNs or MCNs measuring 3cm or greater in diameter
  - presence of high-grade dysplasia or pancreatic cancer on cytology. In this circumstance, imaging should be at the discretion of the provider.

- **Post-op surveillance:**
  - Surgically resected serous cystadenomas, pseudocyst, or other benign cyst:
    - No additional imaging after resection
  - Surgically resected mucinous cystic neoplasms (MCNs) without an associated pancreatic malignancy (can have low, intermediate, or high-grade dysplasia):
    - No additional post-op surveillance
  - Surgically resected MCNs with invasive cancer:
    - Standard surveillance-based pancreatic cancer guidelines (See: **Pancreatic Cancer-Surveillance/Follow-up (ONC-13.5)** in the Oncology Imaging Guidelines) for 5 years. No surveillance required after 5 years.
  - Surgically resected IPMNs
    - IPMN with cancer
      - Pancreatic cancer surveillance guidelines (See: **Pancreatic Cancer-Surveillance/Follow-up (ONC-13.5)** in the Oncology Imaging Guidelines)
    - IPMN with high-grade dysplasia
      - MRI Abdomen without and with contrast (CPT® 74183) or EUS every 6 months
    - IPMN with low- or intermediate-grade dysplasia
      - MRI Abdomen without and with contrast (CPT® 74183) every 2 years
  - Surgically resected solid-pseudopapillary neoplasm with negative margins:
    - MRI Abdomen without and with contrast (CPT® 74183) yearly for 5 years
- See: **MR Cholangiopancreatography (MRCP) (AB-27)** for coding guidelines for MRCP.

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Background and Supporting Information:

Pancreatic cystic lesions include a spectrum of entities ranging from benign lesions, such as pseudocysts and serous cystadenomas, to premalignant neoplasms, including intraductal papillary mucinous neoplasms (IPMNs) and mucinous cystic neoplasms (MCNs) (Elta et al., 2018; Gardner et al., 2024)

IPMNs are mucin-producing epithelial neoplasms that arise from the pancreatic ductal system and are classified as main duct, branch duct, or mixed-type lesions. MCNs are mucin-producing cystic neoplasms that typically occur in the pancreatic body or tail and possess malignant potential. In contrast, serous cystadenomas are generally considered benign lesions and typically do not require surveillance once confidently diagnosed (Elta et al., 2018; European Study Group on Cystic Tumours of the Pancreas, 2018; Gardner et al., 2024).

MRI and MRCP are the preferred imaging modalities for characterization and surveillance of pancreatic cystic lesions because they provide detailed assessment of cyst morphology, pancreatic duct communication, and associated pancreatic abnormalities without ionizing radiation exposure (Fábrega-Foster et al., 2020; Gardner et al., 2024; Vege et al., 2015).

The American Gastroenterological Association and other professional societies recommend MRI as the preferred surveillance examination because it provides superior assessment of the relationship between a cystic lesion and the pancreatic ductal system. CT remains an appropriate alternative when MRI is contraindicated, unavailable, or when additional evaluation of calcifications or other lesion characteristics is needed (European Study Group on Cystic Tumours of the Pancreas, 2018; Fábrega-Foster et al., 2020; Vege et al., 2015).

Endoscopic ultrasound (EUS) provides high-resolution assessment of cyst morphology and permits tissue acquisition through fine-needle aspiration when additional diagnostic information is required. EUS is most commonly used when imaging demonstrates concerning features, when the diagnosis remains uncertain, or when further risk stratification is needed to guide management decisions. The ability to obtain cyst fluid and tissue samples can improve assessment of malignancy risk and inform therapeutic planning (Elta et al., 2018; Facciorusso et al., 2020; Gardner et al., 2024).

Evidence Discussion

Surveillance strategies for pancreatic cystic lesions are based on evidence demonstrating that the risk of malignancy varies according to cyst size, growth rate, morphologic characteristics, and associated clinical findings. Current professional society guidelines support risk-stratified surveillance approaches, with more intensive surveillance recommended for larger cysts and for lesions exhibiting high-risk or worrisome features. The goal of surveillance is to identify progression to high-grade

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dysplasia or invasive carcinoma while minimizing unnecessary procedures and imaging (Elta et al., 2018; European Study Group on Cystic Tumours of the Pancreas, 2018; Gardner et al., 2024).

MRI is the preferred modality for surveillance because it provides high-quality characterization of pancreatic cysts and pancreatic duct anatomy without exposure to ionizing radiation. Professional society guidelines support MRI-based surveillance, while CT serves as an alternative for individuals who cannot undergo MRI (Gardner et al., 2024; Fábrega-Foster et al., 2020; Vege et al., 2015).

Evidence demonstrates that rapid cyst growth, mural nodules, main pancreatic duct dilation, elevated CA 19-9, obstructive jaundice, pancreatitis attributable to the cyst, and new-onset diabetes are associated with increased malignant potential and warrant earlier evaluation with MRI, EUS, or EUS-FNA (Elta et al., 2018; European Study Group on Cystic Tumours of the Pancreas, 2018; Gardner et al., 2024).

EUS plays an important role in the evaluation of cysts with concerning features because it provides detailed lesion characterization and allows tissue acquisition. Evidence supports the use of EUS-guided sampling to improve diagnostic assessment of selected pancreatic cystic lesions (Facciorusso et al., 2020; Gardner et al., 2024).

Postoperative surveillance recommendations vary based on pathology. Benign cystic lesions and noninvasive MCNs have a low risk of recurrence and generally do not require ongoing surveillance following complete resection. In contrast, IPMNs may recur or progress elsewhere within the pancreatic ductal system, supporting continued surveillance after resection, particularly when high-grade dysplasia or invasive carcinoma is present (Elta et al., 2018; Gardner et al., 2024).

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Incidental Pancreatic Mass or Suspected Metastatic Disease to Pancreas (AB-31.2)

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Criteria

- For the evaluation of incidental pancreatic mass or suspected metastatic disease to the pancreas, CT Abdomen with contrast with dual phase imaging (CPT® 74160), or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary.

Evidence Discussion

Multiphasic pancreatic protocol CT and MRI are established imaging modalities for the evaluation of pancreatic masses. Dual-phase CT improves lesion detection and assessment of local extension, while MRI provides additional soft tissue characterization and may be useful when further evaluation is needed. Both modalities are considered appropriate for the assessment of incidental pancreatic masses and suspected pancreatic involvement by metastatic disease (Bolan et al., 2023, McKinney et al., 2021; Megibow, 2023).

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Pancreatic Pseudocysts (AB-32)

Guideline

Pancreatic Pseudocysts (AB-32.1)

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Pancreatic Pseudocysts (AB-32.1)

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See: **Acute Pancreatitis (AB-33.1)** or **Chronic Pancreatitis (AB-33.2)**

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Pancreatitis (AB-33)

Guideline

Acute Pancreatitis (AB-33.1)
Chronic Pancreatitis (AB-33.2)
Exocrine Pancreatic Insufficiency (AB-33.3)
Asymptomatic Elevation of Pancreatic Enzymes (AB-33.4)
References (AB-33)

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Acute Pancreatitis (AB-33.1)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Imaging:
  - **Initial imaging for suspicion of pancreatitis (typical symptoms, less than 48 to 72 hours, first-time presentation):**
    - Abdominal ultrasound (CPT® 76700 or CPT® 76705)
      - Purpose is to establish for the presence/absence of gallstones and biliary ductal dilation.
      - Doppler ultrasound (CPT® 93975) can be approved to assess vasculature, if requested.
    - If ultrasound or CT is performed and is nondiagnostic due to technical limitations (e.g., obesity, overlying gas, etc.):
      - MRI/MRCP (CPT® 74183 or CPT® 74181)
      - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) if ultrasound is nondiagnostic and MRI/MRCP cannot be performed.
    - In suspected acute biliary pancreatitis and/or cholangitis (dilated ducts or choledocholithiasis on ultrasound, elevated liver chemistries with a negative ultrasound, suspicion of cholangitis (classic triad is RUQ pain, fever, and jaundice))
      - MRI/MRCP (CPT® 74183 or CPT® 74181)
  - **Initial imaging in individuals with atypical signs and symptoms when diagnoses other than pancreatitis are being considered (e.g., bowel perforation, bowel ischemia):**
    - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160)
    - MRI/MRCP (CPT® 74181 or CPT® 74183) can be considered medically necessary for pregnant individuals (non-contrast), or those with renal insufficiency (without or without and with depending on request).
  - **Follow-up imaging (late phase and thereafter):**
    - Continued or worsening symptoms:
      - CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen with contrast (CPT® 74160) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)

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- Follow-up of known pancreatic or peri-pancreatic fluid collections (including pseudocysts), to follow-up symptomatic collections, or for interventional planning:
  - MRI/MRCP (CPT® 74183 or CPT® 74181) or CT Abdomen and Pelvis with contrast (CPT® 74177)
    - If requested, CT Abdomen with contrast (CPT® 74160) or Abdominal ultrasound (CPT® 76705 or CPT® 76700) can be approved.

Note:

Frequency or intervals for additional follow-up is not defined and depends on clinical circumstances, response to therapy, etc.

- If, despite initial imaging, the etiology of the pancreatitis is still in doubt:
  - MRI/MRCP (CPT® 74183 or CPT® 74181) or CT Abdomen and Pelvis with contrast (CPT® 74177)
    - If requested, CT Abdomen with contrast (CPT® 74160) can be approved.

◦ **Acute recurrent pancreatitis:**
- Abdominal ultrasound (CPT® 76705 or CPT® 76700)
- MRI/MRCP (CPT® 74183 or CPT® 74181)
- CT Abdomen and Pelvis with contrast (CPT® 74177)
- See: **Chronic Pancreatitis (AB-33.2)**

Background and Supporting Information

- Knowledge base:
  - A diagnosis of acute pancreatitis is established when at least 2 of the following three criteria are present:
    - Characteristic abdominal pain (typically epigastric or left upper quadrant pain with radiation to the back, chest, or flank)
    - Amylase or lipase greater than 3 times the upper limit of normal
    - Imaging findings consistent with acute pancreatitis on cross-sectional imaging studies (e.g., CT or MRI) (Foster et al., 2019; Tenner et al., 2024).
  - The early phase of acute pancreatitis generally occurs during the first week after symptom onset and is characterized predominantly by a systemic inflammatory response (Tenner et al., 2024). During the first week, imaging findings correlate poorly with clinical severity. Advanced imaging is generally most informative when obtained approximately 5–7 days after admission, when local complications have evolved and pancreatic necrosis can be more accurately identified and characterized (Foster et al., 2019; Tenner et al., 2024).
    - Goals of imaging during the early phase:
      - Establish the correct diagnosis of acute pancreatitis or provide an alternative diagnosis

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- Establish the underlying etiology
- Stage the morphologic severity
- Assess for complications in individuals who deteriorate or fail to improve (Expert Panel on Gastrointestinal Imaging et al., 2019; Tenner et al., 2024).

◦ The late phase may extend for weeks to months after the initial episode and is primarily characterized by local complications and the maturation of pancreatic fluid collections (Tenner et al., 2024). Acute peripancreatic fluid collections occur during the first 4 weeks of interstitial edematous pancreatitis. These collections lack a mature wall and are confined by normal fascial planes (Foster et al., 2019). If the acute peripancreatic fluid collection persists beyond four weeks, it may be organized and evolve into a pancreatic pseudocyst or a walled-off necrosis (Foster et al., 2019)

▪ Goals of imaging during late phase:

- Monitor established pancreatic and peripancreatic collections
- Delineate the presence of symptomatic and asymptomatic complications
- Guide interventional and surgical procedures (Expert Panel on Gastrointestinal Imaging et al., 2019; Tenner et al., 2024).

◦ Etiologies of pancreatitis (Tenner et al., 2024):

▪ Gallstones and alcohol account for 75-80% of all cases

▪ Hypercalcemia, hypertriglyceridemia, medications, a benign or malignant obstruction, pancreatic mass, genetic causes (hereditary pancreatitis), autoimmune pancreatitis (IgG4), infectious etiologies, ischemia secondary to vascular disease, anatomic abnormalities (e.g., pancreas divisum), physiologic abnormalities (Sphincter of Oddi dysfunction), idiopathic causes (Tenner et al., 2024).

Evidence Discussion

Abdominal ultrasound is recommended as the initial imaging study in individuals with acute pancreatitis to evaluate for biliary etiologies, particularly cholelithiasis and biliary obstruction, which account for a substantial proportion of acute pancreatitis cases. Ultrasound is effective for detecting gallstones and assessing the biliary tree and therefore plays an important role in identifying the underlying etiology of disease (Porter et al., 2019; Tenner et al., 2024).

Advanced imaging with CT or MRI is generally reserved for individuals in whom the diagnosis remains uncertain or who fail to improve clinically. Contrast-enhanced CT has high diagnostic accuracy for acute pancreatitis and is valuable for evaluating pancreatic necrosis and other complications. MRI/MRCP provides comparable diagnostic capability while offering superior evaluation of the pancreatic and biliary ducts and may be preferred in individuals with contrast allergy, renal insufficiency, suspected

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choledocholithiasis, or pancreatic duct abnormalities (Porter et al., 2019; Tenner et al., 2024).

In individuals with persistent symptoms or clinical deterioration after 48 to 72 hours, CT or MRI is supported for assessment of local complications, including necrotizing pancreatitis and pancreatic or peripancreatic fluid collections (Foster et al., 2019; Greenberg et al., 2016; Tenner et al., 2024).

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Chronic Pancreatitis (AB-33.2)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- If chronic pancreatitis is suspected:
  - Initial imaging:
    - CT Abdomen with contrast (CPT® 74160) **OR** CT Abdomen without and with contrast (CPT® 74170) **OR** CT Abdomen and Pelvis with contrast (CPT® 74177) **OR** CT Abdomen and Pelvis without and with contrast (CPT® 74178) **OR** MRI Abdomen without and with contrast (CPT® 74183)
      - If diagnostic imaging demonstrates chronic pancreatitis (e.g., pancreatic calcification in combination with pancreatic atrophy and/or dilated pancreatic duct):
        - Additional imaging is considered not medically necessary in the absence of new or worsening symptoms
    - If initial CT or MRI is inconclusive or nondiagnostic of chronic pancreatitis, either of the following are considered medically necessary:
      - MRI/MRCP with secretin enhancement (CPT® 74183 or CPT® 74181), OR
      - Endoscopic ultrasound (EUS)
    - If EUS is inconclusive, pancreatic function testing and/or ERCP is considered medically necessary
    - If abdominal ultrasound is requested at any stage for evaluation of chronic pancreatitis, this is considered medically necessary and may be approved in lieu of advanced imaging
  - If initial imaging fails to confirm chronic pancreatitis, but the clinical suspicion remains, repeat CT, MRI/MRCP, secretin-enhanced MRI/MRCP, or EUS may be performed after 6 months.
- Known chronic pancreatitis with new or worsening symptoms suggestive of disease progression or complications, any of the following are considered medically necessary:
  - CT Abdomen with contrast (CPT® 74160) **OR** CT Abdomen without and with contrast (CPT® 74170) **OR** CT Abdomen and Pelvis with contrast (CPT® 74177) **OR** CT Abdomen and Pelvis without and with contrast (CPT® 74178) **OR** MRI/MRCP (CPT® 74183 OR CPT® 74181) **OR** Abdominal ultrasound (CPT® 76700 or CPT® 76705)
  - Possible etiologies of worsening pain include:

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    - peptic ulcer disease
    - GI cancers
    - pseudocysts
    - duodenal or common bile duct obstruction
    - pancreatic duct stone or strictures
    - inflammatory masses at the head of the pancreas:
- For pre-surgical planning or post-surgical evaluation for treatment of complications of chronic pancreatitis:
    - CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170), **OR** MRI/MRCP (CPT® 74183 or CPT® 74181) **OR** Abdominal ultrasound (CPT® 76700 or CPT® 76705)
- Routine screening for pancreatic cancer in chronic pancreatitis:
    - Routine surveillance to monitor for the occurrence of pancreatic cancer in individuals with chronic pancreatitis is not supported at this time.
    - For pancreatic cancer screening guidelines in inherited syndromes, including hereditary pancreatitis, see: **Screening Studies for Pancreatic Cancer (ONC-13.1)** in the Oncology Imaging Guidelines.

Background and Supporting Information

- Chronic pancreatitis (CP) is a progressive inflammatory disorder characterized by irreversible structural pancreatic changes that may result in chronic pain, exocrine pancreatic insufficiency, and endocrine dysfunction (Gardner et al., 2020; Singh et al., 2019; Thierens et al., 2024).
- Secretin-enhanced MRCP provides functional assessment of the pancreatic ductal system by stimulating pancreatic bicarbonate secretion, allowing improved visualization of the main pancreatic duct and side branches when conventional imaging is inconclusive (Gardner et al., 2020; Gonoi et al., 2019).

Evidence Discussion

CT and MRI/MRCP are recommended first-line imaging modalities for the evaluation of chronic pancreatitis because they are widely available and reliably identify characteristic pancreatic structural abnormalities. EUS may be considered when cross-sectional imaging is nondiagnostic but is not generally recommended as an initial diagnostic test because of its invasive nature and interobserver variability (Gardner et al., 2020; Singh et al., 2019).

When conventional imaging remains inconclusive, secretin-enhanced MRCP may improve detection of early chronic pancreatitis through enhanced visualization of pancreatic ductal anatomy and exocrine pancreatic function (Gardner et al., 2020).

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Current evidence does not support routine imaging surveillance for pancreatic malignancy in individuals with chronic pancreatitis. Although pancreatic cancer risk is increased in this population, the American College of Gastroenterology notes a lack of randomized trials or high-quality evidence demonstrating a benefit from routine screening and therefore does not recommend surveillance solely on the basis of chronic pancreatitis (Gardner et al., 2020).

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Exocrine Pancreatic Insufficiency (AB-33.3)

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Criteria

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Pancreatic Insufficiency:
  - The initial evaluation for pancreatic insufficiency should include ONE of the following laboratory results:
    - Elevation in fecal fat
    - Fecal elastase less than 200 mcg/g
    - Serum trypsinogen less than 20ng/mL
  - When ANY of the above laboratory abnormalities are present, the following are considered medically necessary for the evaluation of suspected pancreatic insufficiency
    - CT Abdomen with contrast (CPT® 74160) OR
    - CT Abdomen without and with contrast (CPT® 74170) OR
    - MRI/MRCP (CPT® 74183 or 74181)
  - For suspected pancreatic insufficiency due to known chronic pancreatitis, see: **Chronic Pancreatitis (AB-33.2)**
  - For suspected pancreatic insufficiency due to known cystic fibrosis, see: **(PEDAB-16)** and **(PEDCH-5.1)**
  - For suspected pancreatic cancer, see: **Pancreatic Cancer – Suspected/ Diagnosis (ONC-13.2)**

Background and Supporting Information

Exocrine pancreatic insufficiency (EPI) is characterized by insufficient pancreatic enzyme activity resulting in maldigestion and malabsorption. When intraduodenal pancreatic enzyme levels become significantly reduced, individuals may develop symptoms including steatorrhea, abdominal discomfort, bloating, flatulence, weight loss, and nutritional deficiencies (Forsmark, 2018; Whitcomb et al., 2023).

Common pancreatic disorders associated with EPI include chronic pancreatitis, pancreatic ductal adenocarcinoma, recurrent acute pancreatitis, cystic fibrosis, and prior pancreatic resection (Capurso et al., 2019; Forsmark, 2018; Whitcomb et al., 2023).

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Evidence Discussion

Fecal elastase is a widely accepted first-line test for the evaluation of exocrine pancreatic insufficiency (EPI) because it is noninvasive, readily available, and has good diagnostic performance. Fecal elastase values below 100 mcg/g of stool provide strong evidence of EPI, whereas values between 100 and 200 mcg/g are considered indeterminate and should be interpreted in conjunction with clinical findings and other diagnostic data (Whitcomb et al., 2023).

Additional laboratory markers that may support a diagnosis of EPI include elevated fecal fat and low serum trypsinogen levels. Elevated fecal fat reflects impaired fat digestion resulting from pancreatic enzyme deficiency, while low serum trypsinogen is associated with reduced pancreatic exocrine function and may be particularly useful in advanced disease (Forsmark, 2018; Whitcomb et al., 2023).

Cross-sectional imaging with CT or MRI/MRCP is not diagnostic of EPI itself but is valuable for identifying underlying pancreatic disorders and structural abnormalities that may cause pancreatic exocrine dysfunction. Imaging therefore serves an important role in evaluating the etiology of EPI and supporting management decisions (Forsmark, 2018; Whitcomb et al., 2023).

EPI commonly occurs in individuals with chronic pancreatitis, pancreatic ductal adenocarcinoma, recurrent acute pancreatitis, cystic fibrosis, and prior pancreatic surgery. Consequently, evidence supports evaluation for underlying pancreatic pathology when laboratory findings and clinical symptoms suggest pancreatic exocrine dysfunction (Capurso et al., 2019; Whitcomb et al., 2023).

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Asymptomatic Elevation of Pancreatic Enzymes (AB-33.4)

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Criteria

- If there is the incidental elevation of amylase or lipase:
  - If isolated amylase elevation, prior to imaging, the source of the elevation should be confirmed as pancreatic by the performance of amylase isoenzymes demonstrating that the source is not salivary, or the absence of macroamylase should be ascertained by blood test.
  - If the lipase is elevated alone or in combination with an elevated amylase, or if the amylase is confirmed as pancreatic in origin:
    - Abdominal Ultrasound is medically necessary initially.
    - If US is inconclusive, nondiagnostic, or the elevated pancreatic enzymes persist:
      - MRI/MRCP is medically necessary (CPT® 74183).
        - It is best performed as a secretin-stimulation test in this setting.
      - CT Abdomen (pancreatic protocol, CPT® 74160) is considered medically necessary if there is a contraindication to MRI.
  - If the pancreatic enzyme elevation persists at one year, either MRI Abdomen with MRCP (CPT® 74183) or CT Abdomen with pancreatic protocol (CPT® 74160, when MRI is contraindicated) can be repeated.

Evidence Discussion

Persistent elevation of pancreatic enzymes may be associated with a variety of pancreatic and pancreaticobiliary disorders, including acute pancreatitis, chronic pancreatitis, pancreatic duct abnormalities, and biliary obstruction. However, elevated amylase or lipase levels are not specific for a particular diagnosis and should be interpreted in the context of clinical findings and additional diagnostic testing. Abdominal imaging plays an important role in evaluating the etiology of unexplained pancreatic enzyme elevation and identifying clinically significant pancreatic or pancreaticobiliary pathology (Gonoi et al., 2019; Tenner et al., 2024).

Ultrasound is an appropriate initial imaging modality because it can readily identify biliary duct dilation and cholelithiasis. When ultrasound is nondiagnostic or pancreatic enzyme elevations persist without an identified cause, CT or MRI/MRCP may provide additional evaluation of the pancreas and pancreatic ductal system. MRCP is particularly

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useful for detecting pancreatic duct abnormalities that may contribute to chronic asymptomatic pancreatic hyperenzymemia (Gonoi et al., 2019; Tenner et al., 2024).

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Spleen (AB-34)

Guideline

Spleen (AB-34.1)
Splenic Trauma (AB-34.2)
References (AB-34)

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Spleen (AB-34.1)

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Criteria

- Incidental splenic findings on US:
  - CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary.
- Incidental splenic findings on CT or MRI:
  - Imaging is diagnostic of a benign lesion (e.g., simple cyst or hemangioma) or characteristics are benign-appearing (homogeneous, low attenuation, no enhancement, smooth margins):
    - No follow-up imaging is required
  - Imaging characteristics are not diagnostic:
    - Prior imaging available:
      - One year of stability: no follow-up imaging
      - Lack of stability: consider MRI Abdomen without and with contrast (CPT® 74183) if not already performed, biopsy, or PET/CT (CPT® 78815).
    - No prior imaging available:
      - No known malignancy:
        - Suspicious imaging features: (suggestive of possible malignancy)
          - MRI Abdomen without and with contrast (CPT® 74183), if not already performed or biopsy
          - If MRI remains inconclusive and biopsy is not feasible, then PET/CT (CPT® 78815) is considered medically necessary.
        - Indeterminate imaging features: (equivocal but not suspicious for malignancy)
          - Follow-up MRI Abdomen without and with contrast (CPT® 74183) in 6 and 12 months.
      - Known malignancy:
        - Lesion less than 1 cm: follow-up MRI Abdomen without and with contrast (CPT® 74183) in 6 and 12 months.
        - Lesion 1 cm or greater: consider MRI Abdomen without and with contrast (CPT® 74183), if not already performed, or biopsy
          - If MRI remains inconclusive and biopsy is not feasible then PET/CT (CPT® 78815) is considered medically necessary.
        - Refer to diagnosis-specific criteria in the Oncology Imaging Guidelines, when applicable

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- Clinically detected splenomegaly:
  - Abdominal US (CPT® 76700 or CPT® 76705) should be the first imaging study to evaluate splenic size.
  - If splenomegaly is confirmed, the following evaluation is considered medically necessary prior to advanced imaging:
    - CBC, evaluation of the peripheral blood smear, LFTs, UA, chest x-ray, HIV testing.
      - CT Abdomen without and with contrast or with contrast (CPT® 74170 or CPT® 74160) is considered medically necessary if the etiology of the splenomegaly remains unexplained.
      - MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary for pregnant individuals, or individuals with iodinated contrast allergy.
  - Nuclear medicine imaging of the liver/spleen (CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215, CPT® 78216, or CPT® 78830) is rarely performed, but is considered medically necessary if CT and MRI are contraindicated, as well as for evaluation of an accessory spleen.

Background and Supporting Information

Splenomegaly is defined as abnormal enlargement of the spleen and is typically a manifestation of an underlying systemic disorder rather than a primary splenic condition. Common causes include infectious diseases, hematologic disorders, portal hypertension related to chronic liver disease, inflammatory and autoimmune conditions, infiltrative diseases, and malignancies. Because splenomegaly has a broad differential diagnosis, evaluation is directed toward identifying the underlying etiology and associated systemic manifestations (Aldulaimi & Mendez, 2021).

Initial evaluation commonly includes a comprehensive history and physical examination, laboratory studies such as a complete blood count with differential and liver chemistries, and peripheral blood smear examination when clinically indicated. Additional diagnostic testing and imaging are guided by the suspected underlying cause and associated clinical findings (Aldulaimi & Mendez, 2021).

Evidence Discussion

Evidence supporting routine follow-up imaging of incidental splenic lesions is limited. In a retrospective observational study of 379 individuals with splenic masses identified incidentally on CT, Siewert et al. (2018) found that malignancy was uncommon among individuals without a history of malignancy, constitutional symptoms, or left upper quadrant pain. Among 205 asymptomatic individuals without a known malignancy, only two malignant lesions were identified, and both cases demonstrated additional imaging findings suggestive of systemic disease rather than isolated splenic abnormalities.

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Notably, isolated splenic malignancy was exceedingly rare in the study population. Based on these findings, the authors concluded that incidental splenic masses identified in asymptomatic individuals without a history of malignancy are highly likely to be benign, regardless of imaging appearance. The study further suggested that additional imaging follow-up may not be necessary when no clinical or imaging features raise concern for malignancy (Siewert et al., 2018).

These findings have called into question earlier recommendations for routine surveillance of indeterminate incidental splenic lesions and support a more individualized approach to management. Decisions regarding further evaluation should incorporate clinical presentation, history of malignancy, lesion characteristics, and the presence of additional suspicious imaging findings rather than relying solely on the detection of an incidental splenic lesion (Siewert et al., 2018).

More recent radiology reviews recognize that CT and MRI are valuable tools for characterizing indeterminate splenic lesions, particularly when lesions demonstrate atypical imaging features or occur in individuals with known malignancy or other risk factors. At the same time, these reviews acknowledge the limited evidence supporting serial surveillance of lesions with benign imaging characteristics or long-term stability. Current literature therefore supports additional imaging when clinical or imaging findings raise concern for malignancy, while the benefit of routine surveillance imaging for asymptomatic individuals with benign-appearing incidental lesions remains unproven (Bird et al., 2026; Corvino et al., 2023).

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Splenic Trauma (AB-34.2)

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Criteria

- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) and Ultrasound Pelvis (CPT® 76856 or CPT® 76857) or CT Abdomen and Pelvis without and with contrast (CPT® 74178) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for ANY of the following:
  - Blunt abdominal trauma with suspected splenic rupture, OR
  - Suspected post-procedural splenic injury, OR
  - Individuals with penetrating trauma to the left upper quadrant. See: **Blunt Abdominal Trauma (AB-10)**

Background and Supporting Information

The spleen is a highly vascular organ and is among the most frequently injured abdominal organs following blunt abdominal trauma. Splenic injuries range from minor capsular injuries to life-threatening hemorrhage. Prompt diagnosis is important because imaging findings may influence decisions regarding nonoperative management, angioembolization, or surgical intervention (Kozar et al., 2018; Shi et al., 2019).

Evidence Discussion

The spleen is one of the most commonly injured abdominal organs following blunt abdominal trauma and is at risk for significant hemorrhage because of its highly vascular nature (Kozar et al., 2018; Shi et al., 2019). The primary goal of imaging is the rapid detection of splenic injury and associated intra-abdominal bleeding.

Ultrasound, particularly focused assessment with sonography for trauma (FAST), can rapidly identify free intraperitoneal fluid and is useful in the initial evaluation of trauma individuals. However, ultrasound has limited sensitivity for characterizing splenic parenchymal and vascular injuries (Shi et al., 2019; Patlas, 2021).

In hemodynamically stable individuals, contrast-enhanced CT is the preferred imaging modality because it accurately identifies splenic injury, active hemorrhage, vascular injury, and associated abdominal trauma. CT findings assist in determining injury severity and guiding subsequent management, including observation, embolization, or surgery (Patlas, 2021; Expert Panel on Polytrauma Imaging et al., 2026).

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Indeterminate Renal Lesion (AB-35)

Guideline

Indeterminate Renal Lesion – General Information (AB-35.0)
Indeterminate Renal Lesion (AB-35.1)
Pre-operative Assessment for Robotic Kidney Surgery (AB-35.2)
References (AB-35)

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Indeterminate Renal Lesion – General Information (AB-35.0)

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For acute flank pain, rule out renal stone, see: **Flank Pain, Rule Out or Known Renal/ Ureteral Stone (AB-4)**

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Indeterminate Renal Lesion (AB-35.1)

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Criteria

- Incidental Renal Mass on Ultrasound
  - If categorized as simple cyst or Bosniak I or II, no further imaging is considered medically necessary.
  - Otherwise ONE of the following is considered medically necessary:
    - CT Abdomen without and with contrast (CPT® 74170)
    - MRI Abdomen without and with contrast (CPT® 74183)
    - Contrast-Enhanced Ultrasound (CPT® 76978) for one lesion
    - Targeted Dynamic Ultrasound (CPT ® 76979) if more than one lesion
- CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary for further characterization if the original study reveals incomplete visualization of a renal lesion (for example, if only partially visualized on a CT Chest).

- Incidental Renal Mass on CT
  - If characterized as heterogeneous (thick or irregular wall, mural nodule, septa, or calcification):
    - Considered indeterminate: MRI Abdomen without and with contrast (CPT® 74183) OR CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary
  - If characterized as homogeneous (thin or imperceptible wall, NO mural nodule, septa, or calcification):
    - 10 to 20 HU (Hounsfield units)
      - Likely benign, not fully characterized: no further work-up
    - 21 to 69 HU
      - Considered indeterminate: MRI Abdomen without and with contrast (CPT® 74183) OR CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary
    - 70 HU or greater
      - Hemorrhagic or proteinaceous cyst, unlikely to be neoplastic: no further work-up
  - If characterized as TSTC (too small to characterize) and homogeneous:
    - If labeled likely benign cyst, not fully characterized:
      - No further work-up
    - If labeled inconclusive based on subjective evaluation:

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        - Considered indeterminate: MRI Abdomen without and with contrast (CPT® 74183) (preferred) OR CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary ideally within 6-12 months but no sooner than 6 months.
- Incidental cystic renal mass on CT or MRI without and with contrast (completely characterized, and does NOT contain fat)
  - Bosniak I (benign simple) or II (minimally complicated)
    - No further work-up
  - Bosniak IIF
    - CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary at 6 and 12 months, then yearly for 5 years
    - If no changes for 5 years, cyst is considered benign and of no clinical significance
  - Bosniak III or IV should be referred for additional management or if chosen, active surveillance see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines
- Incidental solid renal mass or incidental mass too small to characterize evaluated on CT or MRI without and with contrast and does NOT contain fat
  - TSTC (too small to characterize)
    - If labeled likely benign cyst:
      - No further work-up
    - If labeled inconclusive based on subjective evaluation:
      - MRI Abdomen without and with contrast (CPT® 74183) (preferred), OR CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary ideally within 6-12 months but no sooner than 6 months.
  - If solid mass less than 1.0 cm
    - MRI Abdomen without and with contrast (CPT® 74183) (preferred), OR CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary beginning at 6 months, then yearly for 5 years
    - If stable at 5 years (average growth of 3 mm or less per year): No further work-up
    - If mass shows growth (4 mm or greater per year) or morphologic change: refer for management, consider renal biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted image MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary
  - Solid mass 1.0-4.0 cm:
    - Considered a small renal neoplasm: refer for management, consider biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted imaging MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary. If active surveillance chosen due to limited life expectancy

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or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines

- Solid renal mass greater than 4.0 cm
  - Considered a renal neoplasm: refer for management, or biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted image MRI Abdomen without and with contrast (CPT® 74183) is medically necessary. If active surveillance chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines

- Incidental renal mass containing fat (contains a region of interest that measures 10 HU or less on CT)
  - No calcification angiomyolipoma (AML)
    - Solitary and without documentation of growth:
      - Less than 4 cm: no further work-up
        - If no prior imaging study for comparison, one follow-up MRI Abdomen without and with contrast (CPT® 74183) OR CT Abdomen without and with contrast (CPT® 74170) can be repeated in 6-12 months to assess for any growth.
      - 4 cm or greater and considered an AML with potential for clinical symptoms: refer for management.
    - Multiple lesions or growth documented based on old studies:
      - Refer for management. If active surveillance chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines.
  - With calcification (suspected renal cell carcinoma):
    - CT Abdomen without and with contrast (CPT® 74170) OR MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary if only a non-contrast CT has been performed. If active surveillance is chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines.
- Active Surveillance: For all Active Surveillance indications, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines

Note: PET/CT or PET/MRI are not considered medically necessary because their role evaluating the incidental renal mass is limited.

Background and Supporting Information:

Bosniak Classification:

Bosniak I (Benign Simple Cyst): Well-defined cyst with a thin (2 mm or less), smooth wall; homogeneous simple fluid attenuation (-9 to 20 HU on CT); no septa, calcifications,

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or solid components. Enhancement of the wall may be present but no enhancing septa or nodules are identified (Silverman et al., 2019).

Bosniak II (Benign Cystic Lesion): Cystic mass with a thin (2 mm or less), smooth wall and up to three thin (2 mm or less) septa. Septa and wall may enhance. Calcifications of any type may be present. Also includes homogeneous hyperattenuating cysts (70 HU or greater on noncontrast CT), homogeneous nonenhancing masses greater than 20 HU on renal mass protocol CT, and homogeneous low-attenuation lesions too small to characterize (Silverman et al., 2019).

Bosniak IIF (Probably Benign): Cystic mass with either a smooth minimally thickened (3 mm) enhancing wall or septa, or many (4mm or greater) thin enhancing septa. These lesions are generally benign but warrant imaging surveillance because of a small risk of malignancy (Silverman et al., 2019).

Bosniak III (Indeterminate Cystic Mass): One or more enhancing thick (4 mm or greater) walls or septa, or enhancing irregular walls or septa with convex protrusions measuring 3 mm or less. These lesions have a substantial risk of malignancy and are considered indeterminate (Silverman et al., 2019)

Bosniak IV (Malignant Cystic Mass): Cystic mass containing one or more enhancing nodules (defined as a convex protrusion measuring 4 mm or greater with obtuse margins, or a convex protrusion of any size with acute margins). These lesions are highly likely to represent malignant cystic renal neoplasms, including cystic renal cell carcinoma (Silverman et al., 2019).

The risk of malignancy generally increases with advancing Bosniak category. Bosniak I and II lesions are considered benign and do not require surveillance. Bosniak IIF lesions warrant imaging follow-up because of a low but measurable risk of malignancy, whereas Bosniak III and IV lesions typically require urologic consultation and consideration of biopsy, surveillance, ablative therapy, or surgical management based on lesion characteristics and individual factors (Campbell et al., 2021; Silverman et al., 2019).

Evidence Discussion

Ultrasound is often sufficient to characterize simple renal cysts, which generally do not require additional imaging evaluation (Expert Panel on Urologic Imaging et al., 2020; Silverman et al., 2019). However, solid renal masses, complex cystic lesions, or lesions that remain incompletely characterized on ultrasound generally warrant further evaluation with multiphasic contrast-enhanced CT or MRI (Silverman et al., 2019; Wang et al., 2020).

The American Urological Association (AUA) recommends obtaining high-quality, multiphase cross-sectional imaging for individuals with a solid or complex cystic renal mass to allow optimal lesion characterization and risk assessment (Campbell et al., 2021a, 2021b; Wang et al., 2020). Similarly, the ACR Appropriateness Criteria support

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contrast-enhanced CT or MRI for the evaluation of indeterminate renal masses because these modalities provide detailed assessment of lesion enhancement, complexity, and malignant potential (Wang et al., 2020).

The Bosniak Classification Version 2019 further emphasizes the importance of contrast-enhanced CT or MRI in the characterization and management of cystic renal masses, facilitating risk stratification and clinical decision-making (Silverman et al., 2019).

Evidence also suggests that contrast-enhanced ultrasound (CEUS) may improve characterization of selected indeterminate renal lesions, particularly in individuals for whom iodinated CT contrast or gadolinium-based MRI contrast is undesirable. CEUS can help distinguish cystic from solid components and assess lesion vascularity. Despite these advantages, CT and MRI remain the primary modalities for comprehensive evaluation and management planning because of their broader anatomic assessment and well-established role in renal mass characterization (Wang et al., 2020; Zarzour et al., 2017).

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Pre-operative Assessment for Robotic Kidney Surgery (AB-35.2)

RL.AB.0035.2.A
v1.0.2027

Criteria

- Pre-operative imaging for robotic kidney surgery is considered medically necessary as follows:
  - If not previously performed:
    - CT Abdomen without and with contrast (CPT® 74170) OR
    - MRI Abdomen without and with contrast (CPT® 74183)
  - CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) OR
  - MRA Abdomen (CPT® 74185), or MRA Abdomen and Pelvis (CPT® 74185 and CPT® 72198)

Background and Supporting Information

Robotic kidney surgery, including partial and radical nephrectomy, is commonly performed for the treatment of renal masses. Preoperative imaging is used to define tumor characteristics, assess anatomic relationships, evaluate renal vasculature, and guide surgical planning to optimize operative outcomes (Campbell et al., 2021a; Campbell et al., 2021b).

Evidence Discussion

Robotic kidney surgery is most commonly performed for localized renal masses. Preoperative cross-sectional imaging is essential for lesion characterization, determination of tumor size and location, assessment of local extension, evaluation of regional anatomy, and visualization of the renal vasculature to facilitate surgical planning (Campbell et al., 2021a; Campbell et al., 2021b).

The American Urological Association recommends high-quality, multiphase cross-sectional abdominal imaging for the evaluation of solid and complex cystic renal masses because imaging findings are central to risk assessment and treatment planning (Campbell et al., 2021a). Contrast-enhanced CT provides detailed anatomic and vascular information and is commonly used for preoperative assessment of renal tumors, including evaluation of tumor complexity, involvement of adjacent structures, and renal arterial and venous anatomy (Herts et al., 2018; Wang et al., 2020).

MRI without and with contrast provides comparable diagnostic information and may be used when CT is contraindicated or when additional soft tissue characterization

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is needed. MRI is particularly useful in individuals with contraindications to iodinated contrast administration and for further evaluation of indeterminate renal masses (Campbell et al., 2021a; Wang et al., 2020).

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Renal Failure (AB-36)

Guideline

Renal Failure (AB-36.1)
References (AB-36)

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Renal Failure (AB-36.1)

AB.RF.0036.1.A
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Criteria

- Initial imaging evaluation of acute or chronic renal failure with EITHER of the following:
  - Ultrasound kidney and bladder (CPT® 76770 or CPT® 76775)
  - Doppler Ultrasound (CPT® 93975 or CPT® 93976)
- MRA Abdomen (CPT® 74185) is considered medically necessary when there is suspected:
  - renal vein/caval thrombosis OR
  - renal artery stenosis as cause of renal failure
- CT Abdomen without contrast (CPT® 74150) is considered not medically necessary except to rule out ureteral obstruction or retroperitoneal mass.
- Nuclear renal imaging (CPT® 78701, CPT® 78707, CPT® 78708, CPT® 78709) is considered medically necessary for ANY of the following:
  - Renal transplant follow-up
  - Kidney salvage versus nephrectomy surgical decisions
  - Acute renal failure with no evidence of obstruction on recent ultrasound.
  - Chronic renal failure to estimate prognosis for recovery.
- Nuclear medicine studies of the kidney (CPT® 78700 or CPT® 78701) are considered medically necessary for evaluation of the following anatomic renal anomalies:
  - Suspected horseshoe kidney OR
  - Suspected solitary or ectopic kidney

Evidence Discussion

Renal ultrasound is the preferred initial imaging examination for the evaluation of acute and chronic renal failure because it provides assessment of renal morphology and is highly sensitive for the detection of hydronephrosis and bladder distention without exposing individuals to ionizing radiation or nephrotoxic contrast agents. Current guidelines support kidney imaging as part of the evaluation of structural kidney abnormalities and potentially reversible causes of kidney dysfunction (KDIGO CKD Work Group, 2024; Nikolaidis et al., 2021).

In individuals with suspected renovascular disease, magnetic resonance angiography (MRA) plays an established role in the evaluation of renal vascular abnormalities. MRA provides detailed assessment of renal artery stenosis, renal vein thrombosis, and other

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vascular disorders that may contribute to impaired renal function. Vascular imaging is most useful when the clinical presentation or laboratory findings suggest a renovascular etiology of kidney dysfunction (Nikolaidis et al., 2021).

CT without contrast may be useful when urinary tract obstruction or retroperitoneal pathology is suspected, particularly when ultrasound findings are inconclusive or incomplete. CT can identify the presence, location, and cause of urinary tract obstruction and detect retroperitoneal masses affecting renal function (Nikolaidis et al., 2021).

In renal transplant recipients, imaging plays a central role in the evaluation of allograft dysfunction. Ultrasound with Doppler assessment is typically the initial imaging modality because it can evaluate graft perfusion, vascular complications, collecting system abnormalities, and obstructive processes. Additional imaging studies may provide complementary information when structural or functional graft impairment is suspected. Current ACR Appropriateness Criteria support the use of multimodality imaging tailored to the suspected cause of transplant dysfunction (Taffel et al., 2025).

Renal scintigraphy provides functional information that cannot be obtained with conventional anatomic imaging. Nuclear renal imaging may assist in assessing differential renal function, prognosis for renal recovery, and surgical decision-making regarding renal preservation versus nephrectomy. Renal scintigraphy can also be useful in the evaluation of congenital renal anomalies, including horseshoe kidney, ectopic kidney, and solitary kidney (ACR, ACNM, & SPR, 2022).

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Renovascular Hypertension (AB-37)

Guideline

Renovascular Hypertension (AB-37.1)

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Renovascular Hypertension (AB-37.1)

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- For consideration of Renovascular Hypertension/Renal Artery Stenosis, see: **Renovascular Hypertension/Renal Artery Stenosis (PVD-6.6)** in the Peripheral Vascular Disease Imaging Guidelines

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Polycystic Kidney Disease (AB-38)

Guideline

Polycystic Kidney Disease (AB-38.1)
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Polycystic Kidney Disease (AB-38.1)

AB.PK.0038.1.A
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Criteria

- Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is considered medically necessary for:
  - suspected polycystic kidney disease OR
  - screening individuals at risk for autosomal dominant polycystic disease (ADPKD)
    - In the absence of any clinical change, follow-up screening is considered not medically necessary if a screening ultrasound was performed at age 40 or later and was negative for any cysts.
    - If an initial ultrasound is negative for any cysts, a follow-up ultrasound is considered medically necessary at the discretion of the ordering provider for individuals less than 40 years of age.
- MRI Abdomen without contrast (CPT® 74181) or CT abdomen without contrast (CPT® 74150) is considered medically necessary for evaluation or management of suspected or confirmed autosomal dominant polycystic kidney disease (ADPKD):
  - if a cystic renal lesion is detected in an individual at-risk of PKD, for diagnostic clarification and prognostic assessment
  - for measurement of volume averaging (Total Kidney Volume – TKV) for risk stratification prior to disease-modifying therapy and for post-treatment follow-up for PKD.
  - Annual follow up imaging at the discretion of the ordering provider

Background and Supporting Information

Ultrasound is the primary imaging modality for screening and diagnosis of autosomal dominant polycystic kidney disease (ADPKD) because it is widely available, noninvasive, and highly effective for detecting renal cysts. Current guidelines support ultrasound as the preferred initial imaging examination for most individuals undergoing evaluation for ADPKD. However, ultrasound may have reduced sensitivity for detecting small renal cysts in younger individuals and in those with early-stage disease, particularly when cyst burden is limited (Gordon et al., 2025; Torres et al., 2025).

Ultrasound also has a high negative predictive value for excluding ADPKD in at-risk individuals, particularly with increasing age. Reported negative predictive values for a negative ultrasound examination are approximately 100% for both PKD1 and PKD2 in individuals aged 40 years and older, 100% for PKD1 and 96.8% for PKD2 in individuals aged 30 to 39 years, and 99.1% for PKD1 and 83.5% for PKD2 in individuals aged 25 to 29 years. These findings support the utility of ultrasound as a screening tool while

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highlighting its lower sensitivity for excluding disease in younger individuals, especially those with PKD2-associated disease (Torres et al., 2025).

Evidence Discussion

Imaging plays a central role in the diagnosis, risk stratification, and management of autosomal dominant polycystic kidney disease (ADPKD). Screening of at-risk individuals with ultrasound is supported by its ability to reliably detect and characterize renal cysts and by its high negative predictive value for excluding disease in appropriate age groups. Ultrasound remains the preferred initial imaging modality because it is widely available, noninvasive, and effective for establishing the diagnosis in most individuals with suspected ADPKD (Gordon et al., 2025; Torres et al., 2025).

Following diagnosis, imaging may be used to assess disease severity and progression. Total kidney volume (TKV) has been shown to correlate with disease progression and future decline in kidney function and is used to inform prognosis and treatment decisions. MRI provides the most accurate and reproducible assessment of TKV and is commonly used for risk stratification, selection of candidates for disease-modifying therapy, and treatment follow-up. CT may also be used when MRI is unavailable or contraindicated (Caserta et al., 2026; Torres et al., 2025).

Advanced imaging may also be necessary to further characterize renal lesions identified in individuals with ADPKD and to support diagnostic clarification when ultrasound findings are inconclusive. MRI is particularly useful for detecting small cysts and providing more detailed assessment of renal anatomy. Although imaging is frequently incorporated into longitudinal disease management, optimal follow-up intervals have not been uniformly established and should be individualized based on disease severity, treatment status, clinical changes, and the intended purpose of imaging evaluation (Caserta et al., 2026; Gordon et al., 2025).

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Hematuria and Hydronephrosis (AB-39)

Guideline

Hematuria with Urinary Tract Infection (UTI) (AB-39.1)
Asymptomatic Hematuria (AB-39.2)
Hematuria and Flank Pain (Suspicion for Renal/Ureteral Stones) (AB-39.3)
Hydronephrosis of Unexplained or Indeterminate Cause (AB-39.4)
References (AB-39)

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Hematuria with Urinary Tract Infection (UTI) (AB-39.1)

AB.HH.0039.1.A
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Criteria

- Individuals suspected to have a UTI as the etiology of microscopic hematuria should be treated for the UTI and should then undergo repeat urinalysis to confirm resolution of the hematuria.
- If the hematuria persists following treatment of UTI, proceed with the risk-based evaluation as per **Asymptomatic Hematuria (AB-39.2)**.

Background and Supporting Information

Signs and symptoms of urinary tract infection (UTI) may include urinary frequency, urinary urgency, dysuria, and burning with urination. Associated laboratory and clinical findings may include positive urine leukocyte esterase, pyuria, fever, and leukocytosis based on laboratory-specific reference ranges. The presence and severity of symptoms vary according to the location and extent of infection and should be interpreted in the context of clinical and laboratory findings (Ward et al., 2026).

Evidence Discussion

The American Urological Association (AUA)/Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction (SUFU) Microhematuria Guideline defines microhematuria as the presence of three or more red blood cells per high-power field on microscopic urinalysis (Barocas et al., 2025). When hematuria is identified in the setting of a urinary tract infection, the infection should be treated and urinalysis repeated following resolution of the infection to determine whether hematuria persists. This approach helps distinguish transient infection-related hematuria from hematuria requiring further diagnostic evaluation (Barocas et al., 2025).

Persistent microhematuria following treatment of a urinary tract infection warrants additional evaluation based on the individual's risk for genitourinary malignancy. The AUA/SUFU guideline recommends a risk-stratified approach that incorporates factors such as age, sex, smoking history, degree of hematuria, and other clinical risk factors to guide the need for cystoscopy and upper tract imaging. Similarly, the ACR Appropriateness Criteria for Hematuria support the use of advanced imaging only after persistent hematuria has been confirmed and the individual's risk profile has been assessed (Barocas et al., 2025; Wolfman et al., 2020).

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This risk-based approach reduces unnecessary imaging and associated costs while maintaining diagnostic effectiveness for clinically significant urinary tract pathology. Evidence suggests that targeting imaging to individuals at elevated risk improves the balance between diagnostic yield and potential harms, including radiation exposure and downstream testing. Individuals with persistent hematuria may ultimately require evaluation for urinary tract malignancy, urolithiasis, or other structural abnormalities based on their overall risk profile and clinical presentation (Barocas et al., 2025; Georgieva et al., 2019; Wolfman et al., 2020).

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Asymptomatic Hematuria (AB-39.2)

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Criteria

- Prior to imaging for the evaluation of microscopic hematuria, individuals should be stratified into low, intermediate, or high risk, based on the following criteria:
  - Low risk (individual meets ALL criteria listed)
    - Women younger than 50 years of age or men younger than 40 years of age
    - Never smoker or fewer than 10 pack years of smoking exposure
    - 3-10 red blood cell (RBC)/high power field (HPF) on a single urinalysis
    - No additional risk factors for urothelial cancer, including:
      - Irritative lower urinary tract symptoms
      - Prior pelvic radiation therapy
      - Prior cyclophosphamide/ifosfamide chemotherapy
      - Family history of urothelial cancer or Lynch Syndrome
      - Occupational exposures to benzene chemicals or aromatic amines (e.g., rubber, petrochemicals, dyes)
      - Chronic indwelling foreign body in the urinary tract
  - Intermediate risk (individual meets ANY ONE of these criteria)
    - Women age 50-59 years, men age 40-59 years
      - 10-30 pack years of smoking
      - 11-25 RBC/HPF on a single urinalysis
      - Low-risk individual with no prior evaluation and 3-10 RBC/HPF on repeat urinalysis
      - Any additional risk factor for urothelial cancer listed above
  - High-risk (individual meets ANY ONE of these criteria)
    - Women or men 60 years of age or older
    - More than 30 pack-years of smoking
    - More than 25 RBC/HPF on a single urinalysis
    - Gross hematuria
- Low- or intermediate-risk individuals:
  - Renal ultrasound (combined with cystoscopy)
    - Low-risk individuals may elect for observation with repeat urinalysis within 6 months. If imaging was not performed initially, and follow-up urinalysis reveals persistent hematuria with 3-10 RBC/HPF the individual may be imaged according to Intermediate-Risk criteria. If more than 10 RBC/HPF, they should be imaged according to High-risk guidelines.

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- High-risk individuals
  - CT Urogram (CPT® 74178) is considered medically necessary (3D imaging is appropriate if requested)
    - If CT is contraindicated, MR Urography is considered medically necessary (CPT® 74183 and 72197)
      - If both CT and MR are contraindicated due to contrast, non-contrast CT Urography or renal ultrasound should be performed. See also: **General Guidelines (AB-1.0): Pregnancy Considerations for Imaging**.
- Persistent microscopic hematuria if previously evaluated by renal ultrasound
  - Imaging as per High-risk individuals above
- For the evaluation of microscopic hematuria in individuals with inherited risk factors for renal cortical tumors, ONE of the following imaging studies is considered medically necessary:
  - Renal ultrasound OR
  - CT Abdomen without and with contrast (CPT® 74170) OR
  - MRI Abdomen without and with contrast (CPT® 74183)

Note:

Inherited risk factors for renal cortical tumors include:

- Von Hippel Lindau
- Birt-Hogg-Dube
- Hereditary Papillary Renal Cell Cancer
- Hereditary Leiomyomatosis Renal Cell Cancer
- Tuberous Sclerosis

- Follow-up
  - Individuals with a negative hematuria evaluation who undergo repeat urinalysis
    - If repeat urinalysis is negative:
      - No further imaging evaluation is considered medically necessary.
    - If repeat urinalysis demonstrates persistent hematuria
      - Repeat imaging with renal ultrasound or CT urography may be considered medically necessary based on clinical circumstances.
- **Note:** 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or 76376) for a CT Urogram can be considered medically necessary.

Background and Supporting

Hematuria may be categorized as gross hematuria or microhematuria. The American Urological Association (AUA)/Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction (SUFU) guideline defines microhematuria as 3 or more red

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blood cells per high-power field on microscopic urinalysis. A positive urine dipstick alone is insufficient to establish the diagnosis and should be confirmed with microscopic examination of the urine (Barocas et al., 2025).

Evidence Discussion

The AUA/SUFU guideline recommends a risk-stratified approach to the evaluation of microhematuria (3 red blood cells per high-power field on microscopy) based on an individual's risk of genitourinary malignancy. When microhematuria is confirmed on microscopic urinalysis, individuals should be categorized as low, intermediate, or high risk to guide subsequent evaluation and imaging (Barocas et al., 2025).

Low-risk individuals may elect repeat urinalysis before proceeding with further evaluation. Intermediate- and high-risk individuals should undergo evaluation of both the upper and lower urinary tracts because the likelihood of identifying clinically significant pathology, including genitourinary malignancy, increases with risk category (Barocas et al., 2025; Wolfman et al., 2020).

For low- and intermediate-risk individuals, renal ultrasound is an appropriate initial upper tract imaging modality because the overall incidence of urinary tract malignancy is low. Ultrasound is noninvasive, readily available, does not expose individuals to ionizing radiation, and demonstrates good sensitivity for detecting renal masses and hydronephrosis (Barocas et al., 2025; Wolfman et al., 2020).

For high-risk individuals, multiphasic CT urography is the preferred initial upper tract imaging study because it provides comprehensive evaluation of the kidneys, collecting systems, and urothelium. MR urography is an appropriate alternative when CT urography is contraindicated (Barocas et al., 2025; Wolfman et al., 2020).

Individuals with contraindications to both CT and MRI, including severe renal dysfunction or contrast allergy, may be evaluated with renal ultrasound or noncontrast CT in conjunction with retrograde pyelography (Barocas et al., 2025).

Individuals with microhematuria and a family history of renal cell carcinoma or a known hereditary renal tumor syndrome should undergo upper tract imaging regardless of risk category because of their increased risk for renal malignancy (Barocas et al., 2025).

In individuals with persistent or recurrent microhematuria following a previously negative evaluation, repeat upper tract imaging may be considered on the basis of ongoing risk assessment, interval clinical change, and shared decision-making. Evidence suggests that a risk-based approach to repeat evaluation balances diagnostic yield with the potential harms and costs associated with unnecessary imaging (Barocas et al., 2025; Georgieva et al., 2019; Wolfman et al., 2020).

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Hematuria and Flank Pain (Suspicion for Renal/Ureteral Stones) (AB-39.3)

AB.HH.0039.3.A
v1.0.2027

Criteria

- CT Abdomen and Pelvis without contrast (CPT® 74176) OR CT Urogram (CPT® 74178)
  - Request for 3-D reconstruction (CPT® 76377 or CPT® 76375) to be performed with a CT Urogram is considered medically necessary.
  - US abdomen or retroperitoneum is considered medically necessary in lieu of CT for any of the above indications.

Background and Supporting Information

Flank pain accompanied by microscopic or gross hematuria is a common presentation of urinary tract stone disease. Urolithiasis may involve the kidneys or ureters and can result in urinary obstruction, hydronephrosis, infection, or renal impairment. Clinical presentation may include flank pain, hematuria, nausea, vomiting, and urinary symptoms (Gupta et al., 2023; Wolfman et al., 2020).

Evidence Discussion

CT of the abdomen and pelvis is the most sensitive imaging modality for the detection and characterization of urinary calculi. It provides accurate assessment of stone size, location, burden, and degree of urinary tract obstruction while also identifying alternative causes of flank pain and hematuria. Noncontrast CT is generally the preferred examination for suspected urolithiasis because of its high diagnostic accuracy for urinary stones. CT urography may be appropriate when evaluation of additional urinary tract pathology, including urothelial malignancy or other structural abnormalities, is clinically indicated (Gupta et al., 2023; Wolfman et al., 2020).

Ultrasound of the abdomen or retroperitoneum is an acceptable alternative initial imaging modality and may be selected when radiation exposure is a concern or when clinically appropriate. Ultrasound can identify hydronephrosis and many renal calculi but is generally less sensitive than CT for detection of ureteral stones (Gupta et al., 2023).

When CT urography is performed, three-dimensional image reconstruction may provide improved visualization of the renal collecting systems, ureters, and urinary bladder. These reconstructed images can facilitate evaluation of urinary tract anatomy, improve assessment of complex abnormalities, and assist in the detection and characterization

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of urothelial lesions when clinically indicated (Wolfman et al., 2020). While MR urography may be considered in select circumstances, such as when ionizing radiation or iodinated contrast administration should be avoided, CT urography remains the preferred modality for comprehensive evaluation of the upper urinary tract because of its superior spatial resolution, broader availability, and higher sensitivity for detecting urothelial lesions and urinary tract calculi (Wolfman et al., 2020).

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Hydronephrosis of Unexplained or Indeterminate Cause (AB-39.4)

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Criteria

- CT Urogram (CPT® 74178)
  - Requests for 3-D reconstruction (CPT® 76377 or CPT® 76375) to be performed with a CT Urogram is considered medically necessary.
  - US abdomen or retroperitoneum is considered medically necessary in lieu of a CT for any of the above indications.
- Retroperitoneal Ultrasound (CPT® 76770) is considered medically necessary every 6 to 12 months for the following:
  - uncomplicated hydronephrosis OR
  - neurogenic bladder OR
  - myelomeningocele (open spinal dysraphism) OR
  - spina bifida

Background and Supporting Information

Hydronephrosis is dilatation of the renal collecting system resulting from impaired urine drainage. Causes may include urinary tract obstruction, vesicoureteral reflux, neurogenic bladder, or other anatomic abnormalities. Identification of the underlying cause is important because persistent obstruction can lead to progressive renal dysfunction (Whitworth et al., 2024).

Evidence Discussion

Newly identified hydronephrosis without a known cause warrants further evaluation to determine the presence and etiology of urinary tract obstruction. CT urography provides comprehensive evaluation of the kidneys, ureters, and bladder and may identify obstructing calculi, strictures, masses, or other causes of hydronephrosis. Three-dimensional reconstruction may provide additional assessment of urinary tract anatomy when CT urography is performed (Whitworth et al., 2024).

Ultrasound of the abdomen or retroperitoneum is an appropriate alternative initial imaging modality and can identify hydronephrosis without exposure to ionizing radiation or intravenous contrast (Whitworth et al., 2024).

Individuals with uncomplicated chronic hydronephrosis, neurogenic bladder, myelomeningocele, or spina bifida may undergo periodic surveillance with

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retroperitoneal ultrasound to monitor for progression and potential renal deterioration (Whitworth et al., 2024).

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Urinary Tract Infection (UTI) (AB-40)

Guideline

Urinary Tract Infection (AB-40.0)
Pyelonephritis (AB-40.1)
Lower Urinary Tract Infection (AB-40.2)
References (AB-40)

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Urinary Tract Infection (AB-40.0)

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These guidelines refer to UTI without Hematuria.

For UTI with Hematuria, see: **Hematuria and Hydronephrosis (AB-39)**

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Pyelonephritis (AB-40.1)

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Criteria

- CT Abdomen and Pelvis without and with contrast (CPT® 74178) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if:
  - complicated clinical context, including diabetes mellitus, immunocompromised state, history of nephrolithiasis, prior renal or urologic surgery, OR
  - fever (101 degrees Fahrenheit [38.5 degrees Celsius] or higher) OR
  - not responding to therapy after 3 days OR
  - recurrent pyelonephritis (at least 1 prior pyelonephritis) OR
  - males with first time UTI or recurrent UTI without etiology

  Note:

  3-D Reconstruction enhances a CT Urogram (CPT® 74178).

  Requests for 3-D reconstruction (CPT® 76377 or 76376) for a CT Urogram can be considered medically necessary.

- MRI Abdomen without or without and with contrast (CPT® 74181 or CPT® 74183) is considered medically necessary if:
  - Elevated creatinine
- Pregnant individuals should be evaluated initially by renal ultrasound (CPT® 76770 or CPT® 76775) and if further imaging is considered medically necessary, MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195).

Background and Supporting Information

Acute pyelonephritis is an infection of the renal parenchyma and collecting system that is typically diagnosed based on clinical presentation and laboratory findings. Common manifestations include fever, flank pain, costovertebral angle tenderness, dysuria, urinary frequency, urgency, pyuria, and bacteriuria (Smith et al., 2022).

Evidence Discussion

Acute pyelonephritis is primarily a clinical diagnosis, and most individuals respond to appropriate antimicrobial therapy without the need for advanced imaging. Therefore, routine imaging is generally not recommended for uncomplicated cases (Smith et al., 2022).

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Advanced imaging may be warranted when complicated infection is suspected, including in individuals with diabetes mellitus, immunocompromising conditions, nephrolithiasis, prior renal or urologic surgery, recurrent pyelonephritis, or persistent symptoms despite appropriate therapy. Contrast-enhanced CT is the preferred imaging modality for evaluating potential complications such as obstruction, abscess, or other structural abnormalities because it demonstrates high diagnostic performance for acute pyelonephritis (reported sensitivity 86.8%, specificity 87.5%) while providing comprehensive assessment of renal and perinephric complications (Smith et al., 2022; Nikolaidis et al., 2022).

MRI may be used when CT is contraindicated or when renal dysfunction limits the use of iodinated contrast. In pregnant individuals, renal ultrasound is the preferred initial imaging modality, with MRI without contrast preferred when additional evaluation is needed. However, according to the American College of Obstetricians and Gynecologists (ACOG), although ultrasonography and MRI are the imaging modalities of choice during pregnancy, CT should not be withheld when these modalities are insufficient, unavailable, or when timely diagnosis is clinically necessary. When the potential maternal benefit outweighs the theoretical fetal risk, CT may be performed to facilitate prompt diagnosis and management, particularly in conditions such as acute pyelonephritis, where delayed diagnosis may increase the risk of maternal complications and preterm labor (ACOG, 2017; Smith et al., 2022).

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Lower Urinary Tract Infection (AB-40.2)

AB.UT.0040.2.A
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Criteria

- CT Abdomen and Pelvis without and with contrast (CPT® 74178) is considered medically necessary if:
  - complicated clinical context including, diabetes mellitus, immunocompromised state, history of nephrolithiasis, prior renal or urological surgery, OR
  - fever (101 degrees Fahrenheit (38.5 degrees Celsius) or higher) OR
  - not responding to therapy after 3 days OR
  - males with first time UTI or recurrent UTI without etiology OR
  - recurrent UTI, defined as 3 or more episodes per year OR
  - recommendation by or in consultation with a urologist or specialist

  Note: 3-D Reconstruction enhances a CT Urogram (CPT® 74178). Requests for 3-D reconstruction (CPT® 76377 or 76376) for a CT Urogram can be considered medically necessary.
- MRI Abdomen and MRI Pelvis without or without and with contrast (CPT® 74181 and CPT® 72195 or CPT® 74183 and CPT® 72197) is considered medically necessary if requested when ALL of the following apply:
  - Criteria (as above) for CT Abdomen and Pelvis without and with contrast (CPT® 74178) are met, AND
  - Elevated creatinine
- See: **Periurethral Cysts and Urethral Diverticula (PV-13)** in the Pelvis Imaging Guidelines

Background and Supporting Information

Lower urinary tract infection (cystitis) is an infection involving the bladder and lower urinary tract. Common symptoms include dysuria, urinary frequency, urinary urgency, suprapubic pain, and pyuria. Most uncomplicated lower urinary tract infections are diagnosed clinically and respond to appropriate antimicrobial therapy (Anger et al., 2022; Venkatesan et al., 2020).

Evidence Discussion

Advanced imaging is generally not indicated for uncomplicated lower urinary tract infections because most individuals respond to appropriate antimicrobial therapy without progression to upper urinary tract disease (Anger et al., 2022; Venkatesan et al., 2020).

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Imaging may be warranted in individuals with a complicated urinary tract infection, recurrent urinary tract infections, or when underlying structural abnormalities are suspected. Risk factors for complicated infection include diabetes mellitus, immunocompromising conditions, nephrolithiasis, prior renal or urologic surgery, and fever. Males with urinary tract infection may also require further evaluation for an underlying anatomic or functional abnormality (Venkatesan et al., 2020).

CT of the abdomen and pelvis is the preferred advanced imaging modality when evaluation for complications or structural abnormalities is required. CT demonstrates high diagnostic performance for acute pyelonephritis and provides superior evaluation of urinary tract obstruction, nephrolithiasis, gas-forming infections, renal abscesses, and other perinephric complications. MRI may be used as an alternative when CT is contraindicated or when renal dysfunction limits the use of iodinated contrast; however, MRI is generally less sensitive for detecting urinary calculi and may be less readily available in acute clinical settings (Venkatesan et al., 2020).

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Patent Urachus (AB-41)

Guideline

Patent Urachus (AB-41.1)

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Patent Urachus (AB-41.1)

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For evaluation of suspected patent urachus, see: **Patent Urachus (PV-23.1)** in the Pelvis Imaging Guidelines.

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Transplant (AB-42)

Guideline

Liver Transplant, Pre-Transplant (AB-42.1)
Liver Transplant, Living Donor Pre-Transplant Imaging (Donor Imaging) (AB-42.2)
Liver Transplant, Post-Transplant Imaging (AB-42.3)
Post-Transplant Lymphoproliferative Disorder (PTLD) (AB-42.4)
Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)
Kidney Transplant, Post-Transplant (AB-42.6)
Heart Transplant (AB-42.7)
References (AB-42)

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Liver Transplant, Pre-Transplant (AB-42.1)

AB.TX.0042.1.A
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Criteria

- Individuals **WITHOUT hepatocellular carcinoma (HCC)** referred to a transplant center for liver transplant evaluation can undergo advanced imaging as follows:
  - Per the transplant institution's protocol, OR
  - Per the studies and intervals listed below:

Imaging Study	Interval	Comments
Both of the following US studies: ◦ Abdominal US (CPT® 76700 or CPT® 76705) and ◦ Doppler (CPT® 93975)	◦ Every 6 months	
ONE of the following abdomen/pelvis advanced imaging studies: ◦ CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) ◦ MRI Abdomen without and with contrast (CPT® 74183)	◦ Annually ▪ Individuals with known cholangiocarcinoma may have more frequent repeat of studies at left per institution's protocol	

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Imaging Study	Interval	Comments
Additional abdomen/ pelvis advanced imaging, for individuals on the transplant list with known Primary Sclerosing Cholangitis (PSC): ◦ MRCP (See: **MRCP (AB-27.1)** for acceptable CPT® codes)	◦ Per the transplant institution's protocol	
◦ CT Chest with or without contrast (CPT® 71260 or CPT® 71250)	◦ One-time ▪ Individuals with known cholangiocarcinoma may have more frequent repeat of studies at left per institution's protocol	◦ Repeat studies based on clinical indications per **Chest Imaging Guidelines**
ONE of the following: ◦ MRI Bone Marrow Blood Supply (CPT® 77084) or ◦ Bone scan (CPT® 78306)	◦ One-time	
Echocardiography with ONE of the following: ◦ CPT® 93306 (preferred) ◦ CPT® 93307 ◦ CPT® 93308	◦ Annually	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications
CT Coronary angiography (CCTA) (CPT® 75574)	◦ Annually	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
Stress imaging in place of but not in addition to CT Coronary angiography (CCTA) - ONE of the following: ◦ CPT® 93350 ◦ CPT® 93351 ◦ CPT® 78452 ◦ CPT® 75563 ◦ CPT® 78492 ◦ CPT® 78431	◦ Annually	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications
For individuals with systemic amyloidosis: ◦ Cardiac MRI – ONE of the following: ▪ CPT® 75557 ▪ CPT® 75561 ◦ If Cardiac MRI is contraindicated or indeterminate, ONE of the following SPECT studies may be performed: ▪ CPT® 78803 ▪ CPT® 78830	◦ One-time	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
If required to further assess CAD seen on a recent CCTA that is of uncertain physiologic significance, CT-FFR (Noninvasive estimated coronary fractional flow reserve derived from coronary computed tomography angiography) with ONE of the following: ◦ CPT® 0501T ◦ CPT® 75580	◦ One-time	See: **Cardiac Imaging in Transplants CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
In place of CT Coronary angiography or stress imaging for initial pre-transplant evaluation, OR If CT Coronary angiography and/or CT-FFR or stress imaging is abnormal WITH addition of right heart catheterization if requested for evaluation of pulmonary hypertension: ◦ Left heart catheterization or left and right heart catheterization with ONE of the following: ▪ CPT® 93458 ▪ CPT® 93454 ▪ CPT® 93460 ▪ CPT® 93456 ◦ Or if prior CABG, with ONE of the following: ▪ CPT® 93459 ▪ CPT® 93455 ▪ CPT® 93461 ▪ CPT® 93457	◦ One-time	Repeat studies as per **Cardiac Imaging in Transplant CD-16**
ONE of the following, for vascular evaluation in anticipation of transplant: ◦ CTA (CPT® 74175) ◦ MRA Abdomen (CPT® 74185)	◦ One-time	

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Imaging Study	Interval	Comments
ANY of the following may be performed immediately prior to transplant: ◦ Abdominal US (CPT® 76700 or CPT® 76705) AND Doppler (CPT® 93975) ◦ CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) OR MRI Abdomen without and with contrast (CPT® 74183) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Pelvis with contrast (CPT® 72193) ◦ CTA (CPT® 74175) OR MRA Abdomen (CPT® 74185)	◦ Once, immediately prior to transplant	

- Individuals **WITH hepatocellular carcinoma (HCC)** referred to a transplant center for liver transplant evaluation can undergo advanced imaging as follows:
  - Per the transplant institution's protocol, OR
  - Per the studies and intervals listed below:

Imaging Study	Interval	Comments
Both of the following US studies: ◦ Abdominal US (CPT® 76700 or CPT® 76705) and ◦ Doppler (CPT® 93975)	◦ Every 6 months	

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Imaging Study	Interval	Comments
ONE of the following abdomen/pelvis advanced imaging studies: ◦ CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) ◦ MRI Abdomen without and with contrast (CPT® 74183)	◦ Every 3 months ▪ Can be approved at interval as requested according to the transplant center's protocol for waitlisted individuals under active locoregional therapy to control tumor growth (i.e., tumor ablation)	
◦ CT Chest with contrast (CPT® 71260)	◦ Every 6 months ▪ Can be approved at interval as requested according to the transplant center's protocol for waitlisted individuals under active locoregional therapy to control tumor growth (i.e., tumor ablation)	
◦ Bone Scan (CPT® 78306)	◦ Every 6 months	
Echocardiography with ONE of the following: ◦ CPT® 93306 (preferred) ◦ CPT® 93307 ◦ CPT® 93308	◦ Annually	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications
CT Coronary angiography (CCTA) (CPT® 75574)	◦ Once in 3 years	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
Stress imaging in place of but not in addition to CT Coronary angiography (CCTA) - ONE of the following: ◦ CPT® 93350 ◦ CPT® 93351 ◦ CPT® 78452 ◦ CPT® 75563 ◦ CPT® 78492 ◦ CPT® 78431	◦ Annually	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications
For individuals with systemic amyloidosis: ◦ Cardiac MRI – ONE of the following: ▪ CPT® 75557 ▪ CPT® 75561 ◦ If Cardiac MRI is contraindicated or indeterminate, ONE of the following SPECT studies may be performed: ▪ CPT® 78803 ▪ CPT® 78830	◦ One-time	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
If required to further assess CAD seen on a recent CCTA that is of uncertain physiologic significance, CT-FFR (Noninvasive estimated coronary fractional flow reserve derived from coronary computed tomography angiography) with ONE of the following: ◦ CPT® 0501T ◦ CPT® 75580	◦ One-time	See: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
In place of CT Coronary angiography or stress imaging for initial pre-transplant evaluation, OR If CT Coronary angiography and/or CT-FFR or stress imaging is abnormal WITH addition of right heart catheterization if requested for evaluation of pulmonary hypertension: ◦ Left heart catheterization or left and right heart catheterization with ONE of the following: ▪ CPT® 93458 ▪ CPT® 93454 ▪ CPT® 93460 ▪ CPT® 93456 ◦ Or if prior CABG, with ONE of the following: ▪ CPT® 93459 ▪ CPT® 93455 ▪ CPT® 93461 ▪ CPT® 93457	◦ One-time	Repeat studies as per **Cardiac Imaging in Transplant CD-16**

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Imaging Study	Interval	Comments
ANY of the following may be performed immediately prior to transplant: ◦ Abdominal US (CPT® 76700 or CPT® 76705) AND Doppler (CPT® 93975) ◦ CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) OR MRI Abdomen without and with contrast (CPT® 74183) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Pelvis with contrast (CPT® 72193) ◦ CTA (CPT® 74175) OR MRA Abdomen (CPT® 74185) ◦ MRI Bone Marrow Blood Supply (CPT® 77084)	◦ Once, immediately prior to transplant	

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Liver Transplant, Living Donor Pre-Transplant Imaging (Donor Imaging) (AB-42.2)

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Criteria

- CT Abdomen with contrast (CPT® 74160) OR CT Abdomen without and with contrast (CPT® 74170) OR MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary to assess liver anatomy and volumetrics.
- MRCP is considered medically necessary to assess biliary anatomy (See: **MRCP (AB-27.1)** for proper coding)
- CTA Abdomen without and with contrast (CPT® 74175) OR MRA Abdomen without and with contrast (CPT® 74185) is considered medically necessary to assess vascular anatomy.
- For donor imaging post-transplant, imaging is considered medically necessary per transplant center protocol. If no transplant center protocol exists, see condition-specific guideline appropriate to the individual's signs and symptoms.

Evidence Discussion

Imaging plays a critical role in the evaluation of potential living liver donors. Comprehensive preoperative assessment of hepatic parenchyma, liver volume, vascular anatomy, and biliary anatomy is necessary to determine donor suitability and support operative planning (Bailey et al., 2023; Cai et al., 2016).

CT, MRI, and MRCP are complementary imaging modalities commonly used during donor evaluation. CT provides detailed assessment of hepatic arterial and venous anatomy and allows accurate liver volumetric analysis, while MRI and MRCP provide detailed evaluation of the hepatic parenchyma and biliary anatomy (Bailey et al., 2023; Borhani et al., 2021; Vernuccio et al., 2021).

Identification of vascular and biliary anatomic variants is critical because these findings may influence donor eligibility, operative technique, and transplant outcomes for both donors and recipients. Consequently, living donor liver transplant evaluation commonly incorporates CT, MRI/MRCP, and dedicated vascular imaging to provide comprehensive preoperative assessment (Bailey et al., 2023; Cai et al., 2016; Dove et al., 2025).

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Liver Transplant, Post-Transplant Imaging (AB-42.3)

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Criteria

- Cardiac Imaging:
  - See: **Cardiac Imaging in Transplants CD-16** in the Cardiac Imaging Guidelines
- Suspected post-operative complications:
  - Vascular thrombosis (suspected hepatic artery thrombosis) imaging is considered medically necessary as follows:
    - Doppler ultrasound (CPT® 93975)
    - CTA Abdomen without and with contrast (CPT® 74175) OR MRA Abdomen without and with contrast (CPT® 74185)
  - Suspicion of biliary anastomotic strictures:
    - MRCP (See: **MRCP (AB-27.1)** for appropriate CPT codes)
    - Vascular imaging as above for vascular thrombosis may also be requested and considered medically necessary for this indication
  - Other suspected post-operative complications (e.g., infection)
    - Imaging as requested by the transplant institution or team
- Transplant individuals without prior HCC or cholangiocarcinoma:
  - Routine post-transplant imaging is considered not medically necessary.
  - If cirrhosis develops post-transplant:
    - See: **Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC) (AB-26.1)**, **Ascites (AB-26.2)**, and **Portal Hypertension (AB-26.3)** for HCC screening guidelines.
  - Fibrosis assessment post-liver transplant:
    - Transient elastography (CPT® 91200) is considered medically necessary, which is the most studied modality in this setting.
- Surveillance after transplant for HCC is medically necessary as follows:
  - Based on RETREAT score
    - 0 points: No additional screening needed
    - 1-3 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 6 months for 2 years.
    - 4 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 6 months for 5 years

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        - 5 points or greater: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 3 months for 2 years, then every 6 months between the 2nd and 5th years.
- If there is a suspicion of recurrent tumor based on clinical findings and/or sequentially increasing AFP:
    - CT Abdomen with contrast (CPT® 74160), CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary
- Imaging after transplant for primary sclerosing cholangitis (PSC):
    - Suspected recurrence of PSC;
        - MRCP (See: **MRCP (AB-27.1)** for proper coding)
- Imaging after transplant for cholangiocarcinoma is considered medically necessary as follows:
    - Liver ultrasound (CPT® 76705 or CPT® 76700) or MRI Abdomen and MRCP (CPT® 74183) every 6 months for 5 years post-transplantation.
    - CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) every 6 months for 5 years post-transplantation

Background and Supporting Information

Consensus recommendations regarding post-transplant surveillance imaging after liver transplantation for hepatocellular carcinoma (HCC) have not been universally established. To address this limitation, Mehta et al. (2017) developed and validated the Risk Estimation of Tumor Recurrence After Transplant (RETREAT) score using cohorts from the University of California, San Francisco (UCSF), Mayo Clinic-Rochester, and Mayo Clinic-Jacksonville, with subsequent external validation in an independent cohort. The RETREAT score is an evidence-based prognostic model designed to estimate the risk of HCC recurrence following liver transplantation and has been incorporated into post-transplant surveillance strategies at several transplant centers, including UCSF (Mehta et al., 2017).

The RETREAT score incorporates three variables: (1) serum alpha-fetoprotein (AFP) level at the time of liver transplantation, (2) the presence or absence of microvascular invasion on explant pathology, and (3) the sum of the diameter of the largest viable tumor and the number of viable tumors identified in the explanted liver. Points are assigned for each variable and combined to generate a total score ranging from 0 to 8, with higher scores indicating a greater risk of post-transplant HCC recurrence (Mehta et al., 2017).

For example, a RETREAT score of 0 is assigned when the AFP level at transplantation is 20 ng/mL or lower, there is no evidence of microvascular invasion, and no viable tumor is identified in the explanted liver. Individuals with a RETREAT score of 0 have an estimated 5-year post-transplant recurrence risk of less than 3% (Mehta et al., 2017).

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The RETREAT score is calculated as follows:

Risk Factor	Score
Alpha-fetoprotein level before LT	
0-20	0
21-99	1
100-999	2
≥1000	3
Microvascular invasion present	2
Sum of the diameter of the largest viable tumor and the number of viable nodules	
0	0
1.1-4.9	1
5.0-9.9	2
≥10	3

Evidence Discussion

Imaging plays a central role in the evaluation of liver transplant recipients because clinical manifestations of graft dysfunction are often subtle and nonspecific. Ultrasound with Doppler evaluation is commonly used for routine assessment of the liver allograft and its vascular structures, while CT, MRI, MR angiography, and MR cholangiography may be utilized when further evaluation of vascular, biliary, parenchymal, or extrahepatic abnormalities is required (Te et al., 2026; Wahab et al., 2026).

There is no universally accepted imaging surveillance schedule following liver transplantation, and imaging is typically guided by transplant center protocols, clinical symptoms, or abnormal laboratory findings. Consequently, multiple imaging modalities

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may be required throughout the lifetime of the liver transplant recipient depending on the suspected complication (Sharma et al., 2025; Wahab et al., 2026).

Individuals with a history of hepatocellular carcinoma (HCC) prior to liver transplantation remain at risk for post-transplant tumor recurrence. Current guidelines support surveillance with multiphasic contrast-enhanced CT or MRI of the abdomen, with chest imaging as appropriate, and risk stratification tools such as the RETREAT score may help guide surveillance decisions (Dove et al., 2026; Filgueira, 2019; Mehta et al., 2017).

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Post-Transplant Lymphoproliferative Disorder (PTLD) (AB-42.4)

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Criteria

- CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for known or suspected PTLD.
- Additional evaluation of suspected PTLD is the same as the evaluation of lymphoma. See: **Post-Transplant Lymphoproliferative Disorders (ONC-27.9)** in the Oncology Imaging Guidelines for further recommendations
- Routine use of imaging to screen for PTLD is considered not medically necessary as there is insufficient supporting evidence.

Background and Supporting Information

Post-transplant lymphoproliferative disorder (PTLD) is a serious complication of solid organ transplantation characterized by abnormal lymphoid proliferation that ranges from benign lymphoid hyperplasia to aggressive lymphoma. PTLD is associated with chronic immunosuppression and is frequently related to Epstein-Barr virus (EBV) infection. The risk and presentation vary according to the type of transplant, degree of immunosuppression, and EBV status of the donor and recipient (Lee et al., 2023; Ligeti et al., 2017).

Evidence Discussion

Imaging plays an important role in the evaluation of suspected PTLD because disease involvement may occur in lymph nodes, solid organs, or extranodal sites and may not be readily identified on ultrasound examination. Contrast-enhanced CT of the chest, abdomen, and pelvis is commonly used to evaluate the extent of disease because PTLD frequently involves multiple nodal and extranodal sites. Advanced cross-sectional imaging assists with detection, staging, treatment planning, and assessment of treatment response (Lee et al., 2023; Ligeti et al., 2017).

Early diagnosis is important because PTLD may respond to reduction of immunosuppressive therapy and other targeted treatments. Advanced cross-sectional imaging can facilitate detection, staging, and treatment planning in individuals with suspected or confirmed PTLD (Lee et al., 2023; Ligeti et al., 2017).

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Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)

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Criteria

Pre-Transplant Evaluation (Per Institution Protocol)

- Individuals referred to a transplant center for kidney or kidney-pancreas transplant evaluation can undergo advanced imaging as follows:
  - Per the transplant institution's protocol, OR
  - Per the studies and intervals listed below:

Imaging Study	Interval	Comments
ONE of the following abdomen/pelvis imaging studies is considered medically necessary: • CT Abdomen and Pelvis without contrast (CPT® 74176) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CTA Abdomen without and with (CPT® 74175) • CTA Abdomen and Pelvis (CPT® 74174) • CTA Pelvis without and with (CPT® 72191)	One-time	
ONE of the following echocardiography studies is considered medically necessary: • CPT® 93306 (preferred) • CPT® 93307 • CPT® 93308	Annual	See also: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

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Imaging Study	Interval	Comments
ONE of the following stress imaging studies is considered medically necessary: • CPT® 93350 • CPT® 93351 • CPT® 78452 • CPT® 75563 • CPT® 78492 • CPT® 78431	Annual	See also: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications

Additional Pre-Transplant Evaluation (Per Indication)

Individuals referred to a transplant center for kidney or kidney-pancreas transplant evaluation can undergo the following additional advanced imaging when the listed indications are met:

Indication	Imaging Study	Interval	Comments
• 20 pack-year history of smoking	ONE of the following is considered medically necessary: • CT Chest without contrast (CPT® 71250) • CT Chest with contrast (CPT® 71260)	One-time	For lung cancer screening with Low Dose Computed Tomography (LDCT), see: **U.S. Preventative Services Task Force: Lung Cancer Screening (Commercial and Medicaid) (CH-33.1)**
• Autosomal dominant polycystic kidney disease	ONE of the following is considered medically necessary: • MRA Head (CPT® 70544, 70545, or 70546) • CTA Head (CPT® 70496)	One-time	Repeat imaging as per **Intracranial Aneurysms (HD-12.1)**

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Indication	Imaging Study	Interval	Comments
• History of stroke, or • History of TIA, or • Carotid bruit on exam	ONE of the following is considered medically necessary: • Carotid duplex bilateral study (CPT® 93880 or CPT® 93882)	One-time	Repeat imaging as per **Initial Imaging (PVD-3.1)**
• Presence of systemic amyloidosis	ONE of the following cardiac MRI studies is considered medically necessary: • CPT® 75557 • CPT® 75561	One-time	See also: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications
BOTH of the following: • Presence of systemic amyloidosis AND • Cardiac MRI is either contraindicated or indeterminate	ONE of the following nuclear medicine studies is considered medically necessary: • CPT® 78803 • CPT® 78830	One-time	See also: **Cardiac Imaging in Transplant CD-16** for descriptions of CPT codes or further indications
• In place of stress imaging for initial pre-transplant evaluation, or • Stress imaging is positive for ischemia	ONE of the following heart catheterization is considered medically necessary: • CPT® 93458 • CPT® 93454 • If prior CABG: ◦ CPT® 93459 ◦ CPT® 93455	One-time	Repeat imaging as per **Cardiac Imaging in Transplant CD-16**

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Kidney Donor Nephrectomy or Pre-Transplant Nephrectomy

Indication	Imaging Study	Comments
• Individuals being evaluated for living kidney donation, or • Individual is planning removal of one or both kidneys	ONE of the following is considered medically necessary: • CTA Abdomen (CPT® 74175) • MRA Abdomen (CPT® 74185) • MRI Abdomen without and with contrast (CPT® 74183)	For CTA and MRA, 3D rendering is included with the original study

Background and Supporting Information

Kidney transplantation requires careful preoperative evaluation of both transplant candidates and potential living donors. Imaging is used to assess renal anatomy, vascular anatomy, and potential abdominal or pelvic abnormalities that may affect transplant eligibility, operative planning, or post-transplant outcomes (Cheng et al., 2022; Lentine et al., 2017).

Evidence Discussion

Individuals undergoing evaluation for kidney or kidney-pancreas transplantation may require cross-sectional imaging of the abdomen and pelvis to identify anatomic abnormalities, assess vascular anatomy, and detect conditions that could affect transplant candidacy or surgical planning (Cheng et al., 2022; Lentine et al., 2017).

CTA or MRA may be utilized to evaluate vascular anatomy and, in selected individuals, to assess the native kidneys when pre-transplant nephrectomy is being considered. Imaging protocols may vary among transplant centers and are often incorporated into standardized transplant evaluation pathways (Lentine et al., 2017).

Because cardiovascular disease is a major cause of morbidity and mortality in individuals with chronic kidney disease, pre-transplant evaluation commonly includes cardiac risk assessment. Additional cardiac imaging may be appropriate in selected high-risk individuals based on transplant center protocols and clinical findings (Cheng et al., 2022; VanWagner et al., 2018).

Individuals with autosomal dominant polycystic kidney disease (ADPKD) may undergo CT or MR angiography of the head to evaluate for intracranial aneurysms when clinically indicated (Lentine et al., 2017). Potential living kidney donors typically undergo CT or

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MR angiography to assess renal size, anatomy, and vascular variants that may affect donor suitability and surgical planning (Aghayev et al., 2019; Lentine et al., 2017).

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Kidney Transplant, Post-Transplant (AB-42.6)

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Criteria

- Ultrasound of transplanted kidney:
  - Current ultrasound imaging protocols of the transplanted kidney commonly include a Doppler study and are coded as CPT® 76776.
    - Do not report non-invasive vascular codes CPT® 93975 and CPT® 93976 in conjunction with CPT® 76776.
  - Ultrasound of the transplanted kidney performed without duplex Doppler should be reported as a limited retroperitoneal ultrasound (CPT® 76775).

Background and Supporting

Kidney transplant recipients require ongoing monitoring for graft function and potential post-transplant complications. Complications may include vascular abnormalities, urinary obstruction, fluid collections, rejection, infection, and other causes of allograft dysfunction (Expert Panel on Urological Imaging, Taffel et al., 2025).

Evidence Discussion

Imaging plays an important role in the evaluation of the renal allograft for routine surveillance and assessment of suspected graft dysfunction. Ultrasound with Doppler is the preferred initial imaging modality because it is noninvasive, widely available, and allows assessment of transplant kidney morphology, perfusion, vascular patency, and urinary tract obstruction without exposure to ionizing radiation or intravenous contrast (Expert Panel on Urological Imaging, Taffel et al., 2025).

Current transplant kidney ultrasound protocols routinely incorporate Doppler evaluation because vascular complications are an important cause of graft dysfunction. Doppler assessment provides evaluation of transplant perfusion and vascular integrity as part of the standard sonographic examination (Expert Panel on Urological Imaging, Taffel et al., 2025).

Additional imaging may be required when ultrasound findings are inconclusive or when further evaluation of transplant-related complications is needed. The choice of imaging modality is typically guided by clinical findings, laboratory abnormalities, and transplant center protocols (Expert Panel on Urological Imaging, Taffel et al., 2025).

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Heart Transplant (AB-42.7)

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- For cardiac transplant imaging indications, see: **Cardiac Imaging in Transplants (CD-16)**

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Hepatic and Abdominal Arteries (AB-43)

Guideline

Hepatic Arteries and Veins (AB-43.1)
Abdominal Veins Other than Hepatic and Portal Veins (AB-43.2)
Renal Vein Thrombosis (AB-43.3)
References (AB-43)

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Hepatic Arteries and Veins (AB-43.1)

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Criteria

- **Portal Vein Thrombosis (PVT):**
  - Doppler US (CPT® 93975) is the initial noninvasive modality for the diagnosis of Portal Vein Thrombosis
  - CT Abdomen with contrast (CPT® 74160 or 74170 – 4 phase CT), MRI Abdomen without and with contrast (CPT® 74183) or CTA Abdomen (CPT® 74175) is considered medically necessary for ANY of the following:
    - to assess the extension of thrombus into the mesenteric veins when Doppler US (or other imaging, such as abdominal US) is positive for PVT
    - to exclude tumor thrombus among individuals with cirrhosis who develop new portal and/or mesenteric vein thrombosis
    - for continued concern for PVT (for example in an individual with a hypercoagulable state or abdominal malignancy) if Doppler US is negative or inconclusive
  - To assess for development of intestinal ischemia among individuals with known portal and/or mesenteric vein thrombosis (MVT) (e.g., development of fever, rebound, leukocytosis, elevated serum lactate levels):
    - See: **Mesenteric Ischemia (AB-6.1)** for additional imaging indications
  - For suspicion of portal hypertensive or portal cavernoma cholangiopathy in individuals with known PVT or MVT (cholestatic liver chemistry profile (See **Abnormal Liver Chemistries (AB-30.1)**), known portal cavernoma, extrahepatic biliary abnormalities on imaging):
    - MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary
- **For routine follow-up of PVT:**
  - US/Doppler every 6 months. If these are reported as not providing adequate visualization, CT Abdomen (CPT® 74160), MRI Abdomen (CPT® 74183), or CTA Abdomen (CPT® 74175), is considered medically necessary.
- **For follow-up of PVT being treated with anticoagulation:**
  - US/Doppler, CT Abdomen with contrast (CPT® 74160), MRI Abdomen without and with contrast (CPT® 74183), or CTA Abdomen (CPT® 74175) is considered medically necessary in 3-6 months.
  - Further follow-up every 6 months with US/Doppler unless these are reported as not providing adequate visualization, in which case any of the above studies can be approved.
- **TIPS (transjugular intrahepatic portosystemic shunt):**

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- Pre-procedure evaluation:
  - Abdominal US, including Doppler (CPT® 76700 and/or CPT® 93975), Multiphase CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183) is considered medically necessary
  - Echocardiogram (CPT® 93306) (see: **Transthoracic Echocardiography (TTE) – Indications/Initial Evaluation (CD-2.2)**)
- For routine follow-up to monitor stent patency:
  - US with Doppler (CPT® 93975) is considered medically necessary 7-14 days after shunt creation, and then at 3 months, 6 months, and then every 6 months thereafter.
    - If requested earlier than the above intervals because of a clinical deterioration or suspicion of stent occlusion, the Doppler is considered medically necessary.
- If Doppler imaging is indeterminate or if there is a negative Doppler with clinical signs of worsening portal hypertension the following is considered medically necessary:
  - Multiphase CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)
- Echocardiogram (CPT® 93306) is considered medically necessary for the following:
  - One time post-procedure for routine follow up
  - Any time post-procedure:
    - for new signs or symptoms
    - for concern for new or worsening pulmonary hypertension
    - See also: **Frequency of Echocardiography Testing (CD-2.3)** in the Cardiac Imaging Guidelines

- **For the evaluation of Budd-Chiari Syndrome (BCS)**
  - Doppler US (CPT® 93975) is the initial diagnostic test for the evaluation of BCS.
  - CT Abdomen with contrast (CPT® 74160), or MRI Abdomen without and with contrast (CPT® 74183) or CTA Abdomen (CPT® 74175) is considered medically necessary for ANY of the following:
    - to assess thrombus extension
    - to rule out tumor thrombus
    - to assess response to anticoagulation therapy
    - if there is high suspicion of BCS despite a negative or inconclusive Doppler US

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        - to additionally assess indeterminate hepatic nodules detected on the prior US (any of the above studies or CT Abdomen without and with contrast CPT® 74170)
    - For pre-operative evaluation of anticipated interventional vascular therapies or TIPS the following is considered medically necessary:
        - Abdominal US, including Doppler (CPT® 76700 and/or CPT® 93975), Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)
    - For HCC Surveillance in individuals with chronic BCS the following is considered medically necessary:
        - Abdominal US (CPT® 76700 or CPT® 76705) and serum alpha-fetoprotein every 6 months
        - Triphasic CT Abdomen (CPT® 74160 or CPT® 74170), or MRI Abdomen (CPT® 74183) for the evaluation of hepatic nodules seen on US or AFP greater than or equal to 15 ng/ml.
        - The LiRADS reporting system does not apply to HCC surveillance in this population, due to the vascular origin of many of the hepatic imaging abnormalities.
- **Hereditary Hemorrhagic Telangiectasia (HHT)**
    - The liver may be involved in individuals with HHT, and artery-to-vein or vein-to-vein shunting may occur resulting in liver vascular malformations (LVMs).
    - Screening the liver for LVMs is considered not medically necessary.
    - For symptoms suggestive of liver vascular malformations (LVMs) (including an audible bruit or palpable thrill over the hepatic region on physical examination, abnormal liver tests) or for the development of signs or symptoms of heart failure, biliary ischemia, hepatic encephalopathy, mesenteric ischemia, or portal hypertension the following is medically necessary:
        - CT Abdomen with contrast (CPT® 74160), CTA Abdomen (CPT® 74175), MRI Abdomen without and with (CPT® 74183), MRCP (CPT® 74183), or MRA Abdomen (CPT® 74185)
- CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) is considered medically necessary additionally for:
    - Evaluation of portal and hepatic veins prior to or following surgical intervention for the treatment of portal hypertension (See: **Portal Hypertension (AB-26.3)**)
    - Evaluation of hepatic vasculature prior to and following embolization procedure (See: **Hepatocellular Carcinoma (HCC) – Restaging/Recurrence (ONC-14.4)** and **Hepatocellular Carcinoma (HCC) – Surveillance/Follow-up (ONC-14.5)** and **Liver Metastases (ONC-31.2)** in the Oncology Imaging Guideline)
    - Evaluation of hepatic vasculature prior to planned hepatectomy (See: **Liver Transplant, Pre-Transplant (AB-42.1)**)

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- Evaluation of liver donor (See: Liver Transplant, **Living Donor Pre-Transplant Imaging (Donor Imaging) (AB-42.2)** for specific guidance)

- **Hepatic arterial aneurysms:**
  - See: **Visceral Artery Aneurysm (PVD-6.5)** in the Peripheral Vascular Disease Imaging Guidelines

Background and Supporting Information

Primary Budd-Chiari syndrome is a rare vascular liver disorder caused by thrombotic obstruction of the hepatic venous outflow tract, involving the hepatic veins and, less commonly, the inferior vena cava. Most affected individuals have an underlying prothrombotic condition, including myeloproliferative neoplasms, inherited thrombophilias, systemic inflammatory disorders, or hormonal risk factors. Secondary Budd-Chiari syndrome occurs when hepatic venous outflow is impaired by external compression or direct invasion of the hepatic veins by a malignant or nonmalignant mass (Simonetto et al., 2020).

The clinical manifestations of Budd-Chiari syndrome vary according to the extent and duration of venous obstruction and may include abdominal pain, hepatomegaly, ascites, portal hypertension, and progressive liver dysfunction. Long-standing disease may result in hepatic fibrosis and cirrhosis (Simonetto et al., 2020).

The Liver Imaging Reporting and Data System (LI-RADS) should not be applied to individuals younger than 18 years of age or to individuals with cirrhosis related to congenital hepatic fibrosis or vascular disorders, including Budd-Chiari syndrome, chronic portal vein occlusion, cardiac congestion, and hereditary hemorrhagic telangiectasia. These populations were not included in the validation cohorts used to develop LI-RADS, and imaging findings may differ from those observed in more typical causes of cirrhosis (Simonetto et al., 2020).

Evidence Discussion

Imaging plays a central role in the diagnosis and management of hepatic venous and portal venous disorders. Doppler ultrasound is commonly used as the initial imaging modality for suspected Budd-Chiari syndrome and portal venous disorders because it can evaluate vessel patency, direction of flow, and hemodynamic abnormalities associated with hepatic venous outflow obstruction (Northup et al., 2021; Simonetto et al., 2020).

Cross-sectional imaging with contrast-enhanced CT, MRI, CTA, or MRA may be necessary when ultrasound findings are inconclusive or when more comprehensive assessment of thrombus extent, collateral vessels, adjacent structures, and treatment planning is required. These modalities provide detailed evaluation of the hepatic and portal vasculature and may identify associated complications or underlying causes of

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vascular obstruction (Margini & Berzigotti, 2017; Northup et al., 2021; Simonetto et al., 2020).

Cross-sectional vascular imaging is particularly important when interventional treatment is being considered. Detailed evaluation of the hepatic and portal venous systems facilitates procedural planning for transjugular intrahepatic portosystemic shunt (TIPS) placement, variceal embolization, and retrograde transvenous obliteration by defining vascular anatomy, identifying collateral pathways, and determining technical feasibility. Imaging findings may directly influence procedural approach and treatment selection (Boike et al., 2022; Dariushnia et al., 2016; Lee et al., 2024).

Current American College of Gastroenterology guidance does not support routine screening for liver vascular malformations in asymptomatic individuals because evidence is insufficient to demonstrate improved clinical outcomes from screening in the absence of symptoms or other clinical indications. Imaging is therefore generally directed by clinical presentation, suspected complications, and the need for diagnostic or therapeutic planning (Simonetto et al., 2020).

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Abdominal Veins Other than Hepatic and Portal Veins (AB-43.2)

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Criteria

- CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) is considered medically necessary if ONE of the following:
  - Nephrotic syndrome
  - Renal vein thrombosis
  - Mesenteric vein thrombosis
- Suspicion of iliac vein thrombus when a lower extremity duplex or abdominal duplex is inconclusive or equivocal, see: **Acute Deep Venous Thrombosis (DVT) (PVD 12.2)**
- Suspicion of inferior vena cava thrombus when a lower extremity duplex or abdominal duplex is inconclusive or equivocal, see: **Acute Deep Venous Thrombosis (DVT) (PVD 12.2)**

Background and Supporting Information

Abdominal venous disorders may involve the renal veins, mesenteric veins, inferior vena cava, or other non-hepatic abdominal venous structures. Venous thrombosis can impair venous drainage and may lead to abdominal pain, bowel ischemia, renal dysfunction, portal hypertension, or other significant complications. Accurate assessment of venous patency and thrombus extent is important for diagnosis and management (Simonetto et al., 2020; Björck et al., 2017).

Evidence Discussion

Cross-sectional vascular imaging plays an important role in the diagnosis and management of abdominal venous thrombosis. CT angiography (CTA) provides detailed evaluation of the abdominal venous system, adjacent abdominal organs, and surrounding soft tissues and has high diagnostic accuracy for identifying mesenteric venous thrombosis. In addition to detecting venous thrombus, CTA can assess bowel wall changes, mesenteric edema, bowel ischemia, and other intra-abdominal complications that may influence treatment decisions and prognosis (Björck et al., 2017; Expert Panels on Vascular Imaging and Gastrointestinal Imaging et al., 2018).

MR angiography (MRA) provides comprehensive evaluation of the abdominal venous circulation and may serve as an alternative to CTA when avoidance of ionizing radiation

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or iodinated contrast is desirable. Both CTA and MRA allow assessment of thrombus location, extent, collateral venous pathways, and involvement of adjacent vascular structures. These modalities are useful for diagnosis, treatment planning, and follow-up of mesenteric venous thrombosis, renal vein thrombosis, and other abdominal venous disorders (American College of Radiology (ACR), North American Society for Cardiovascular Imaging (NASCI), & Society for Pediatric Radiology (SPR)., 2020; Simonetto et al., 2020).

Individuals with nephrotic syndrome are at increased risk for venous thromboembolic complications, including renal vein thrombosis. Advanced vascular imaging may therefore be necessary when venous thrombosis is suspected in this population (Chopard et al., 2020; Simonetto et al., 2020).

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Renal Vein Thrombosis (AB-43.3)

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Criteria

- MRA Abdomen (CPT® 74185) is considered medically necessary if ONE of the following:
  - Nephrotic syndrome
  - Proteinuria – 3 grams or more in 24 hours
  - Lupus nephritis
  - Hypercoagulable state, ONE of the following:
    - Antiphospholipid antibodies
    - Behçet's syndrome
    - Protein C deficiency
    - Protein S deficiency

Background and Supporting Information

Renal vein thrombosis (RVT) is a thrombotic occlusion of the renal venous system that may occur in association with nephrotic syndrome, severe proteinuria, lupus nephritis, and inherited or acquired hypercoagulable disorders. Clinical manifestations may include flank pain, hematuria, declining renal function, or may be asymptomatic in some individuals. Nephrotic syndrome is among the most common predisposing conditions because of the increased risk of venous thromboembolism associated with urinary loss of anticoagulant proteins (Chopard et al., 2020; Northup et al., 2021).

Evidence Discussion

Individuals with nephrotic syndrome, significant proteinuria, lupus nephritis, and hypercoagulable disorders are at increased risk for renal vein thrombosis. Early diagnosis is important because untreated renal vein thrombosis may contribute to renal dysfunction and other thromboembolic complications (Chopard et al., 2020; Northup et al., 2021).

Magnetic resonance angiography (MRA) provides noninvasive evaluation of the renal venous system and can identify renal vein thrombosis, assess thrombus extent, and evaluate associated vascular abnormalities. MRA provides comprehensive vascular assessment without exposure to ionizing radiation and may serve as an alternative to catheter-based angiography when detailed evaluation of abdominal venous pathology is required (ACR, NASCI, & SPR, 2020).

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Advanced vascular imaging is particularly valuable when renal vein thrombosis is suspected in individuals with nephrotic syndrome, lupus nephritis, or known hypercoagulable states because these conditions substantially increase the risk of venous thromboembolic disease. Cross-sectional vascular imaging can confirm the diagnosis, define the extent of venous involvement, identify collateral venous pathways, and support treatment planning and longitudinal management (Chopard et al., 2020; Northup et al., 2021).

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Suspected Neuroendocrine Tumors of the Abdomen (AB-44)

Guideline

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Suspected Neuroendocrine Tumors of the Abdomen (AB-44)

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For the evaluation of a suspected neuroendocrine tumor of the abdomen: See **Gastrointestinal/Pancreatic Neuroendocrine Cancers - Suspected/Diagnosis (ONC-15.2)** in the Oncology Imaging Guidelines.

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Liver Elastography (AB-45)

Guideline

Liver Elastography (AB-45)
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Liver Elastography (AB-45)

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Criteria

- Initial staging of liver fibrosis in suspected fatty liver disease (hepatic steatosis):
  - Transient Elastography or Vibration-Controlled Transient Elastography (VCTE, e.g. Fibroscan) (CPT® 91200) is considered medically necessary as the initial imaging modality.
    - Typically repeated within a 3-year period
    - If repeat transient elastography is technically unsuccessful or unreliable, refer to MRE criteria below.
  - Magnetic Resonance Elastography (MRE, CPT® 76391) is considered medically necessary for ANY of the following:
    - Transient Elastography failure despite use of an XL-probe
    - BMI 35 kg/m² or greater
    - Conflict between clinical picture and transient elastography results (e.g., individual with portal hypertension but VCTE suggests no fibrosis)
    - VCTE liver stiffness measurement of 8 kPa or greater
    - FIB 4 score greater than 2.67
    - Liver biopsy demonstrates fibrosis stage F2-F4
- Special considerations for MRE:
  - For MRE requests in the setting of hemochromatosis, see: **Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases (AB-11.2)**)
  - For individuals for whom drug treatment is a consideration and EITHER of the following:
    - Evaluation for liver stiffness as part of required assessment for drug candidacy
    - Evaluation for liver stiffness to assess treatment efficacy as required by the drug manufacturer and/or FDA
  - Note: The correct CPT code for MR Elastography is CPT® 76391. It is a stand-alone code and it does not require an additional CPT code such as MRI Abdomen (CPT® 74183).
  - An additional MRI Abdomen code should only be approved if there is another appropriate indication for it, other than the Elastography study (for example, MRE for fibrosis scoring in MASLD (formerly known as NAFLD) due to a BMI of 35 kg/m² or greater, AND further evaluation of an indeterminate hepatic lesion).
- The use of other ultrasound elastographic codes (CPT® 76981, CPT® 76982, and CPT® 76983) is considered not medically necessary.

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Background and Supporting Information

Liver fibrosis is a key determinant of prognosis in chronic liver disease because the severity of fibrosis is closely associated with risks of hepatic decompensation, hepatocellular carcinoma, liver-related mortality, and overall mortality. Histologic fibrosis is commonly staged using the METAVIR scoring system, which ranges from F0 (no fibrosis) to F4 (cirrhosis). Other validated histologic staging systems include the Ishak and Batts-Ludwig classifications (Lim et al., 2017; Sterling et al., 2025).

Assessment of liver fibrosis has increasingly shifted toward noninvasive methods because liver biopsy carries procedural risks and is subject to sampling variability. Current gastroenterology and hepatology guidelines support vibration-controlled transient elastography (VCTE) as a first-line noninvasive modality for fibrosis assessment in many chronic liver diseases because it is widely available, well validated, and capable of identifying advanced fibrosis and cirrhosis. Magnetic resonance elastography (MRE) may be particularly useful when VCTE results are unreliable, technically limited, or when assessment of fibrosis is needed in selected higher-risk populations, including individuals with metabolic dysfunction-associated steatotic liver disease (MASLD) (Lim et al., 2017; Sterling et al., 2025).

Vibration-controlled transient elastography (VCTE; e.g., FibroScan®, CPT® 91200) is the most extensively studied elastography technique and is incorporated into multiple evidence-based practice guidelines for fibrosis assessment. Current national guidelines do not recommend acoustic radiation force impulse imaging (ARFI) or real-time tissue elastography (RTTE) in preference to VCTE for routine clinical evaluation of liver fibrosis (Lim et al., 2017; Sterling et al., 2025).

The Fibrosis-4 (FIB-4) Index is a commonly used noninvasive fibrosis assessment tool that incorporates age, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and platelet count. The index is calculated as: FIB-4 = (Age × AST) ÷ [Platelet Count × √ALT]. FIB-4 is frequently used as an initial risk-stratification test because it can help identify individuals who are unlikely to have advanced fibrosis and those who may benefit from additional evaluation with elastography or specialist referral (Kanwal et al., 2021; Rinella et al., 2023; Younossi et al., 2021).

Evidence Discussion

Targeted screening of individuals at increased risk for advanced chronic liver disease is recommended to facilitate identification of clinically significant fibrosis and cirrhosis before the development of hepatic decompensation and other liver-related complications. Early detection allows implementation of risk-reduction strategies, monitoring, and disease-specific treatment when appropriate (Cusi et al., 2022; Kanwal et al., 2021; Rinella et al., 2023).

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Although liver biopsy remains the reference standard for fibrosis staging, its use is limited by sampling variability, procedural risk, and cost. Consequently, noninvasive fibrosis assessment tools have become increasingly important in clinical practice (Lim et al., 2017; Sterling et al., 2025).

Among laboratory-based fibrosis assessments, the Fibrosis-4 (FIB-4) Index is one of the most extensively validated noninvasive tools and is frequently used as an initial risk-stratification test. FIB-4 can help identify individuals at low risk for advanced fibrosis and those who may benefit from additional evaluation with elastography or specialist referral. A FIB-4 score greater than 2.67 is associated with an increased likelihood of advanced fibrosis and warrants further assessment (Kanwal et al., 2021; Rinella et al., 2023).

Liver stiffness measurement obtained through VCTE is an established noninvasive method for fibrosis assessment. VCTE-derived liver stiffness measurements less than 8 kPa may help exclude advanced fibrosis, particularly when used in conjunction with FIB-4. Values between 8 and 12 kPa may be associated with significant fibrosis, while values greater than 12 kPa are associated with a high likelihood of advanced fibrosis or cirrhosis (Sterling et al., 2025; Vuppalanchi et al., 2018; Rinella et al., 2023).

Magnetic resonance elastography (MRE) is generally not considered a first-line fibrosis risk-stratification test but may be valuable when VCTE results are inconclusive, when clinical findings and elastography results are discordant, when cross-sectional imaging is otherwise indicated, or when technical factors limit VCTE reliability. In individuals with metabolic dysfunction-associated steatotic liver disease (MASLD), MRE may demonstrate greater diagnostic accuracy and lower false-positive rates compared with VCTE for the detection of advanced fibrosis (Imajo et al., 2022; Lim et al., 2017; Selvaraj et al., 2021).

Noninvasive fibrosis assessment also has an important role in longitudinal disease monitoring and treatment decision-making. Serial liver stiffness measurements may help assess fibrosis progression or regression over time and may provide objective evidence of response to therapy. In individuals receiving treatment with resmetirom, follow-up elastography may assist in monitoring treatment response and disease progression as part of ongoing clinical management (Chen et al., 2025; Gidener et al., 2023; Sterling et al., 2025).

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Hiccups (AB-46)

Guideline

Hiccups (AB-46.0)
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Hiccups (AB-46.0)

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Criteria

- Hiccups may be associated with cerebrovascular disease, brain tumors, and intracranial injury, though it would be very rare for hiccups to be the only presenting symptom of serious neurologic disease. If concern is expressed for neurologic involvement, please see the appropriate guideline in HD imaging (e.g., **Neuromyelitis Optica and NMO Spectrum Disorders (HD-16.2)** and **Anti-MOG syndromes (HD-16.3)**)
- Hiccups lasting less than 48 hours without any localizing or specific symptoms:
  - No advanced imaging is considered medically necessary
- Hiccups lasting 48 hours or longer:
  - History and physical examination, laboratory and CMP and baseline chest x-ray
  - Abnormal or negative chest x-ray with symptoms referable to the chest:
    - CT Chest with contrast (CPT® 71260) is considered medically necessary
  - Lab or history/physical findings suggest a gastrointestinal etiology:
    - CT Abdomen with contrast (CPT® 74160) is considered medically necessary

Evidence Discussion

Hiccups are involuntary, repetitive contractions of the diaphragm and intercostal muscles followed by abrupt closure of the glottis. Most episodes are benign, self-limited, and resolve without diagnostic testing or treatment. As a result, advanced imaging is generally not indicated for acute hiccups in the absence of concerning symptoms or abnormal clinical findings (Bredenoord, 2013; Moretto et al., 2013).

Persistent hiccups, defined as symptoms lasting 48 hours or longer, warrant further clinical evaluation because they may be associated with gastrointestinal, neurologic, cardiopulmonary, metabolic, infectious, or neoplastic disorders. Initial evaluation typically includes a thorough history, physical examination, laboratory testing, and chest radiography. Additional diagnostic testing should be guided by clinical findings and suspected underlying etiologies (Arwani et al., 2023; Brañuelas Quiroga et al., 2016; Steger et al., 2015).

Thoracic symptoms such as wheezing, dyspnea, cough, abnormal chest radiography, or other findings suggestive of intrathoracic pathology may warrant CT imaging of the chest. When gastrointestinal symptoms, laboratory abnormalities, or other clinical findings suggest an abdominal, hepatic, pancreatic, or esophageal source, abdominal imaging and/or gastrointestinal evaluation may be appropriate. Neurologic

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evaluation should also be considered in individuals with persistent or intractable hiccups particularly if accompanied by focal neurologic deficits or other findings suggestive of central nervous system pathology, if workup of other causes is unrevealing, or if other symptoms are persistent despite treatment/intervention. In such cases, brain MRI is generally preferred because brainstem and medullary lesions, including stroke, demyelinating disease, tumors, and other structural abnormalities, have been reported as causes of persistent or intractable hiccups (Brañuelas Quiroga et al., 2016; Leung et al., 2020; Steger et al., 2015). Because persistent hiccups may occasionally be the presenting manifestation of serious underlying disease, diagnostic evaluation should be individualized according to the clinical presentation (Bredenoord, 2013; Pooran et al., 2006; Yamazaki et al., 2008).

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Retroperitoneal Fibrosis (AB-47)

Guideline

Retroperitoneal Fibrosis (AB-47.0)
References (AB-47)

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Retroperitoneal Fibrosis (AB-47.0)

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Criteria

- Individuals diagnosed with retroperitoneal fibrosis:
  - ONE of the following every 3 months is considered medically necessary until stability demonstrated:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
    - Retroperitoneal or Abdominal ultrasound (CPT® 76770 or CPT® 76700) can be considered medically necessary if requested.
  - After stability established repeat imaging is considered medically necessary every 6 months.
  - Requests for non-contrasted studies in individuals with renal insufficiency is considered medically necessary. Gadolinium may induce nephrogenic systemic fibrosis in individuals with moderate or severe renal insufficiency, especially if the GFR is less than 30 ml/min.
  - Additional imaging:
    - CT Chest with contrast (CPT® 71260) is also considered medically necessary upon initial diagnosis if requested, to further evaluate for the possibility of malignancy as an underlying etiology.
- PET/CT (CPT® 78815)
  - Can be considered medically necessary initially, after diagnosis, to establish avidity patterns to assess for the likelihood of malignancy and for stratification for the likelihood of response to steroids.
  - Follow-up is considered medically necessary if there is documentation of an anticipated therapeutic change based on the results (such as a change in immunosuppression therapy or stent removal).
- Methysergide-induced retroperitoneal fibrosis:
  - Individual screening is considered medically necessary at baseline and then every 6 months with ONE of the following:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - CT Abdomen and Pelvis without contrast (CPT® 74176)
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)

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- Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775)

Background and Supporting Information

Retroperitoneal fibrosis is a rare fibroinflammatory disorder that may be idiopathic, including IgG4-related and non-IgG4-related forms, or secondary to other conditions. Secondary causes include malignancy, infection, prior radiation therapy, prior abdominal surgery, and certain medications. Although methysergide is no longer widely available, it has historically been associated with the development of retroperitoneal fibrosis (Kermani et al., 2011; Vaglio et al., 2026).

The disease commonly involves the retroperitoneal soft tissues surrounding the abdominal aorta and iliac vessels and may result in ureteral obstruction, hydronephrosis, vascular involvement, and renal dysfunction (Łoń et al., 2022; Vaglio et al., 2026).

Evidence Discussion

Cross-sectional imaging plays a central role in the diagnosis, characterization, and follow-up of retroperitoneal fibrosis. Although ultrasound may be useful as an initial screening examination, it has limited sensitivity and is often insufficient to distinguish retroperitoneal fibrosis from other retroperitoneal masses (Mehedra et al., 2025; Peisen et al., 2020).

CT and MRI are the primary imaging modalities used for evaluation of retroperitoneal fibrosis. These modalities allow assessment of the extent and morphology of disease, involvement of adjacent vascular and urinary tract structures, and the presence of associated abdominal abnormalities. They are also useful for monitoring disease progression and response to treatment (Peisen et al., 2020; Vaglio et al., 2026).

FDG-PET may provide additional information regarding disease activity and may be useful for differentiating active inflammation from inactive fibrosis, assessing treatment response, or evaluating for underlying malignancy. However, PET findings are nonspecific and should not be used as the sole basis for diagnosis (Peisen et al., 2020; Vaglio et al., 2026).

Periodic follow-up imaging may be appropriate to assess disease stability, progression, or therapeutic response. Because the clinical course of RPF is variable and relapse may occur despite treatment, imaging surveillance should be individualized according to disease activity, treatment status, symptom burden, and the presence of complications such as ureteral obstruction or renal dysfunction (Kermani et al., 2011; Vaglio et al., 2026).

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Fistulae (AB-48)

Guideline

Fistulae (AB-48)
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Fistulae (AB-48)

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Criteria

- Suspected enteric fistulae
  - ONE of the following is considered medically necessary:
    - MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), OR
    - CT Enterography or CT Abdomen and Pelvis with contrast (CPT® 74177), OR
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
- Suspected colovesical fistulae
  - ONE of the following is considered medically necessary:
    - CT Abdomen and Pelvis without contrast (CPT® 74176), OR
    - MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), OR
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
- Enterocutaneous fistulae
  - Suspected enterocutaneous fistulae or surgical planning of known complex fistulae:
    - ONE of the following is considered medically necessary:
      - CT Abdomen and Pelvis with contrast (CPT® 74177), OR
      - MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), OR
      - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT®72197)
- Complicated diverticulitis with fistula, see: **Lower Abdominal Pain (AB-2.2)**
- Perianal/perirectal fistulae and abscess related to Crohn's disease, see: **Perirectal/ Perianal Crohn's Disease (AB-23.3)**
- Other fistulae related to Crohn's disease, see: **Known IBD (AB-23.2)**
- Perianal/perirectal fistulae NOT related to Crohn's disease, see: **Fistula in Ano (PV-21.1)** in the Pelvis Imaging Guidelines
- For colovaginal, rectovesicular, rectovaginal, or urinary-vaginal communicating fistulae, see: **Pelvic Fistula (PV-21.3)** in the Pelvis Imaging Guidelines
- For pilonidal cyst, see: **Pilonidal Cyst (PV-21.4)** in the Pelvis Imaging Guidelines

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Background and Supporting Information

Gastrointestinal fistulae are abnormal communications between the gastrointestinal tract and adjacent organs, tissues, vascular structures, or the skin. Examples include tracheoesophageal, bronchoesophageal, enterocutaneous, enteroenteric, enterocolic, enterovesical, colovesical, rectovaginal, perianal, and aortoenteric fistulae.

Fistulae may arise from a variety of underlying conditions, including inflammatory bowel disease (particularly Crohn's disease), diverticulitis, malignancy, prior surgery, radiation therapy, obstetric injury, trauma, infection, or foreign bodies. Postoperative fistulae represent the most common cause of intestinal fistula formation, although inflammatory and neoplastic conditions remain important etiologies depending on the fistula location and individual population (Dolejs et al., 2019; Lichtenstein et al., 2018).

Evidence Discussion

MR enterography is particularly valuable in the evaluation of Crohn's disease-related fistulae and small bowel disease because it provides detailed assessment of both luminal and extraintestinal manifestations. MR enterography can identify active bowel inflammation, sinus tracts, fistulae, abscesses, and other penetrating complications while simultaneously evaluating disease extent and activity. As a result, it has become an important imaging modality for diagnosis, treatment planning, and disease monitoring in individuals with Crohn's disease (Greer & Taylor, 2022; Guimarães et al., 2020; Kucharzik et al., 2025).

CT and CT enterography provide excellent anatomic detail and remain important imaging modalities for evaluation of enteric, enterocutaneous, and colovesical fistulae, particularly when acute complications, abscesses, bowel perforation, post-operative abnormalities, or associated intra-abdominal pathology are suspected. CT may also facilitate preoperative planning in individuals with complex fistulous disease (Dolejs et al., 2019; Expert Panel on Gastrointestinal Imaging et al., 2020).

Both MRI and CT play important roles in the detection and characterization of fistulous disease. In a meta-analysis evaluating small bowel Crohn's disease, MR enterography and CT enterography demonstrated similar diagnostic performance for assessing active disease, with pooled sensitivities of 87.9% and 85.8% and pooled specificities of 81.2% and 83.6%, respectively (Qiu et al., 2014). MRI may be preferred in individuals with Crohn's disease who require repeated imaging because it avoids cumulative radiation exposure and provides superior soft-tissue characterization, particularly for pelvic and perianal fistulous disease. CT remains particularly valuable in acute clinical settings because of its rapid acquisition, widespread availability, and ability to evaluate associated abdominal complications. Imaging selection should therefore be individualized according to the suspected fistula type, underlying disease process, clinical presentation, and local expertise (Greer & Taylor, 2022; Qiu et al., 2014; Yanai et al., 2025).

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Procedure Codes Associated with General Abdomen Imaging Guidelines

Guideline

Procedure Codes Associated with General Abdomen Imaging

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Procedure Codes Associated with General Abdomen Imaging

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The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72192	Computed tomography, pelvis; without contrast material
72193	Computed tomography, pelvis; with contrast material(s)
72195	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s)
72197	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s), followed by contrast material(s) and further sequences
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74150	Computed tomography, abdomen; without contrast material
74160	Computed tomography, abdomen; with contrast material(s)
74170	Computed tomography, abdomen; without contrast material, followed by contrast material(s) and further sections
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74176	Computed tomography, abdomen and pelvis; without contrast material
74177	Computed tomography, abdomen and pelvis; with contrast material(s)

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Code	Description
74178	Computed tomography, abdomen and pelvis; without contrast material in one or both body regions, followed by contrast material(s) and further sections in one or both body regions
74181	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s)
74182	Magnetic resonance (eg, proton) imaging, abdomen; with contrast material(s)
74183	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s), followed by with contrast material(s) and further sequences
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
74261	Computed tomographic (CT) colonography, diagnostic, including image postprocessing; without contrast material
74262	Computed tomographic (CT) colonography, diagnostic, including image postprocessing; with contrast material(s) including non-contrast images, if performed
74263	Computed tomographic (CT) colonography, screening, including image postprocessing
76497	Unlisted computed tomography procedure (eg, diagnostic, interventional)
76498	Unlisted magnetic resonance procedure (eg, diagnostic, interventional)
76391	Magnetic resonance (eg, vibration) elastography
78811	Positron emission tomography (PET) imaging; limited area (eg, chest, head/neck)
78812	Positron emission tomography (PET) imaging; skull base to mid-thigh
78813	Positron emission tomography (PET) imaging; whole body
78814	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; limited area (eg, chest, head/neck)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh
78816	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; whole body

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Code	Description
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
76700	Ultrasound, abdominal, real time with image documentation; complete
76705	Ultrasound, abdominal, real time with image documentation; limited (eg, single organ, quadrant, follow-up)
76770	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), real time with image documentation; complete
76775	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), real time with image documentation; limited
76776	Ultrasound, transplanted kidney (with duplex Doppler)
76830	Ultrasound, transvaginal
76856	Ultrasound, pelvic (nonobstetric), real time with image documentation; complete
76857	Ultrasound, pelvic (nonobstetric), real time with image documentation; limited or follow-up (eg, for follicles)
76978	Ultrasound, targeted dynamic microbubble sonographic contrast characterization (non-cardiac); initial lesion
76979	Ultrasound, targeted dynamic microbubble sonographic contrast characterization (non-cardiac); each additional lesion with separate injection (List separately in addition to code for primary procedure
76981	Ultrasound, elastography; parenchyma (eg, organ)
76982	Ultrasound, elastography; first target lesion
76983	Ultrasound, elastography; each additional target lesion

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Code	Description
0648T	Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained without diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure) during the same session; single organ
0649T	Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained with diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure); single organ (List separately in addition to code for primary procedure
0697T	Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained without diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure) during the same session; multiple organs
0698T	Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained with diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure); multiple organs (List separately in addition to code for primary procedure
75580	Noninvasive estimate of coronary fractional flow reserve (FFR) derived from augmentative software analysis of the data set from a coronary computed tomography angiography, with interpretation and report by a physician or other qualified health care professional
78226	Hepatobiliary System Imaging, Including Gallbladder When Present
78227	Hepatobiliary System Imaging, Including Gallbladder When Present; with Pharmacologic Intervention, Including Quantitative Measurement(s) When Performed
78707	Kidney Flow and Function, Single Study without Pharmacologic Intervention
78708	Kidney Imaging with Vascular Flow and Function with Pharmacological Intervention, Single
78709	Kidney Imaging with Vascular Flow and Function with and without Pharmacological Intervention, Multiple

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Code	Description
78801	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days
78802	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (eg, head, neck, chest, pelvis) or acquisition, single day imaging
78804	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, requiring 2 or more days imaging
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis) or acquisition, single day imaging
78831	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
78832	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
78075	Adrenal Nuclear Imaging of the cortex and/or medulla

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Code	Description
78264	Gastric Emptying Study
78265	Gastric emptying study with small bowel transit
78266	Gastric emptying study with small bowel and colon transit
78278	Gastrointestinal Bleeding Scintigraphy
78290	Meckel's diverticulum imaging
78291	Peritoneal-Venous Shunt Patency
78201	Liver Imaging Static
78202	Liver Imaging with Vascular Flow
78215	Liver and Spleen Imaging Static
78216	Liver and Spleen Imaging with Vascular Flow
78700	Kidney Imaging (Nuclear) Static
78701	Kidney Imaging (Nuclear) with Vascular Flow
78707	Kidney Flow and Function, Single Study without Pharmacologic Intervention
78708	Kidney Imaging with Vascular Flow and Function with Pharmacological Intervention, Single
78709	Kidney Imaging with Vascular Flow and Function with and without Pharmacological Intervention, Multiple
91200	Liver elastography, mechanically induced shear wave (eg, vibration), without imaging, with interpretation and report
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)

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Code	Description
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
78492	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93307	Echocardiography, transthoracic, real-time with image documentation (2d) with or without m-mode recording; complete
93308	Echocardiography, transthoracic, real-time with image documentation (2d) with or without m-mode recording; follow-up or limited study
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation

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Code	Description
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93975	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study

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Code	Description
93976	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study

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Abbreviations for Breast Guidelines

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Abbreviations for Breast Guidelines	
ADH	atypical ductal hyperplasia
ALH	atypical lobular hyperplasia
BI-RADS®	Breast Imaging Reporting and Database System
BRCA	breast cancer gene
CAD	computer-aided detection
CT	computed tomography
CTA	computed tomography angiography
CTV	computed tomography venography
DCIS	ductal carcinoma in situ
FDA	Food and Drug Administration
FDG	fluorodeoxyglucose
FEA	flat epithelial atypia
FNA	fine needle aspiration
HRCT	high-resolution computed tomography
LCIS	lobular carcinoma in situ
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging

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Abbreviations for Breast Guidelines	
NSM	nipple-sparing mastectomy
PEM	positron-emission mammography
PET	positron-emission tomography

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General Guidelines (BR-Preface 1.0)

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Criteria

- A current clinical evaluation since the onset or change in symptoms is usually required prior to considering advanced imaging.
  - A clinical evaluation should include the following:
    - A relevant history and physical examination since the onset or change in symptoms
    - Appropriate laboratory studies and non-advanced imaging modalities, such as mammogram and/or ultrasound
    - Other meaningful contact (telephone call, electronic mail or messaging) since the onset or change in symptoms by an established individual can substitute for a face-to-face clinical evaluation.
- Current clinical evaluation is not required prior to screening studies.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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BI-RADS® Categories Chart (BR-Preface 1.1)

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BI-RADS® Categories Chart	
Category	**Description**
Category 0: Incomplete	Need additional imaging evaluation or prior mammograms for comparison. Category 0 classification requires that additional imaging study be specified, e.g., ultrasound, additional mammogram view, MRI.
Category 1: Negative	There is nothing to comment on. The breasts are symmetrical and no masses, architectural disturbances, or suspicious calcifications are present.
Category 2: Benign Finding	This is also a negative mammogram, but the interpreter may wish to describe a finding. Involuting, calcified fibroadenomas, multiple secretory calcifications, fat-containing lesions (such as oil cysts, lipomas, galactoceles, and mixed density hamartomas) all have characteristic appearances, and may be labeled with confidence. The interpreter might wish to describe intramammary lymph nodes, implants, etc. while still concluding that there is no mammographic evidence of malignancy.

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BI-RADS® Categories Chart	
Category	**Description**
Category 3: Probably Benign Finding – Short Interval Follow-up Suggested	A finding placed in this category should have a very high probability of being benign. It is not expected to change over the follow-up interval, but the radiologist would prefer to establish its stability. Data is becoming available that sheds light on the efficacy of short interval follow-up. This category should not be used on follow-up exams that show a new finding or an area of concern which has increased in size or extent. If the finding remains unchanged after 2 to 3 years, it is changed to a Category 2 finding.
Category 4: Suspicious Abnormality – Biopsy Should Be Considered	There are lesions that do not have the characteristic morphologies of breast cancer but have a definite probability of being malignant. The radiologist has sufficient concern to urge a biopsy. If possible, the relevant possibilities should be cited so that the individual and their physician can make the decision on the ultimate course of action.
Category 5: Highly Suggestive of Malignancy – Appropriate Action Should Be Taken	These lesions have a high probability of being cancer and should be biopsied or treated surgically.
Category 6: Known Biopsy-Proven Malignancy – Appropriate Action Should Be Taken	These lesions have been biopsied and are known to be malignant.

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BI-RADS® Breast Density Categories (BR-Preface 1.2)

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BI-RADS® Breast Density Categories
Category A: Almost entirely fatty
Category B: Scattered fibroglandular densities
Category C: Heterogeneously dense
Category D: Extremely dense

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MRI Breast Coding (BR-2)

Guideline

MRI Breast Coding (BR-2.1)

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MRI Breast Coding (BR-2.1)

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Criteria

- The use of gadolinium contrast is required for the evaluation of breast parenchyma.
- The use of gadolinium contrast is considered **NOT** medically necessary for the evaluation of implant integrity in asymptomatic, average-risk individuals.
- Throughout these guidelines, when MRI Breast is considered medically necessary, either **ONE** of the following codes is supported (unless otherwise specified per indication):
  - CPT® 77049 MRI Breast Bilateral, including CAD, without and with contrast
  - HCPCS C8908 MRI Breast Bilateral, without and with contrast
- If the individual meets medical necessity for advanced imaging to assess implant integrity, the appropriate code is CPT® 77047 MRI Breast Bilateral, without contrast.
- Computer-aided detection (CAD) is included with the MRI Breast CPT® 77049 and CPT® 77048 procedures.
  - Since the CAD software automatically performs 3D imaging, CPT® 76376 or CPT® 76377 should **NOT** be used in conjunction with MRI Breast.

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Breast Reconstruction (BR-3)

Guideline

Breast Reconstruction (BR-3.1)

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Breast Reconstruction (BR-3.1)

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Criteria

- CTA or MRA of the body part **from which the free-tissue transfer flap is being taken** can be performed for breast reconstruction pre-operative planning.
  - Examples include:
    - CTA Abdomen and/or Pelvis (CPT® 74175 or CPT® 72191 or CPT® 74174) or MRA Abdomen and/or Pelvis (CPT® 74185 and/or CPT® 72198) for Deep Inferior Epigastric Perforators (DIEP) flap
    - CTA Chest (CPT® 71275) for Thoracodorsal Artery Perforator (TDAP) flap
    - CTA Lower Extremity (CPT® 73706) for a donor flap from the gluteal region (i.e., SGAP [Superior Gluteal Artery Perforator], IGAP [Inferior Gluteal Artery Perforator]) or thigh (i.e., TUG [Transverse Upper Gracilis], VUG [Vertical Upper Gracilis], DUG [Diagonal Upper Gracilis], PAP [Profunda Artery Perforator], or other gluteal/thigh perforator flaps)
- Routine use of CTA Chest (CPT® 71275) to evaluate **recipient** vessels is considered **NOT** medically necessary.
  - **Criteria exception**: In circumstances where there has been previous cardiac/vascular surgery and/or known vascular anomalies in the chest, it may be warranted.
- There is currently insufficient evidence-based data to support the need for routine advanced imaging for TRAM flaps or other flaps performed on a vascular pedicle.

Evidence Discussion

The American College of Radiology (ACR) Appropriateness Criteria® stated that either MRA abdomen and pelvis without and with intravenous (IV) contrast or CTA abdomen and pelvis with IV contrast are usually appropriate for pre-operative planning in individuals undergoing DIEP flap breast reconstruction (Singh et al., 2022).

Studies have found CTA mapping results in a shorter operative time when compared with no mapping in cases of breast reconstruction with free-tissue flap transfer (e.g., with Deep Inferior Epigastric Perforator (DIEP) flaps) (Wade et al., 2018).

In contrast, routine use of CTA chest to evaluate for recipient vessels (often the internal mammary vessels) is not medically necessary. This is because a number of studies have found that the anatomy and course of these vessels is largely consistent, and that there is good concordance between surgical and radiological findings – either with ultrasound or CTA (Murray et al., 2012). CTA, however, carries with it significant risks,

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including contrast nephrotoxicity and allergic reactions, and the significantly higher risk of radiation exposure in the chest than in the abdomen (Rozen et al., 2013). As such, many surgeons will use hand-held doppler ultrasound either pre- and/or intra-operatively to evaluate recipient vessels. In certain circumstances, such as with previous surgery and/or radiation that would be expected to affect the candidacy of potential recipient vessels, pre-operative CTA of the chest may be considered.

As pedicled flaps, by definition, do not require a microvascular anastomosis and are not disconnected from their blood supply, there is no current evidence to support routine pre-operative imaging in these individuals. A recent study evaluating the use of pre-operative CTA in individuals undergoing pedicled TRAM flap reconstruction found that there was no significant difference in terms of operative time nor flap loss in individuals who had a pre-operative CTA compared to those who did not (Fong et al., 2023).

Per the National Comprehensive Cancer Network (NCCN) (2026a), "common donor sites for autologous tissue include the abdomen (ie, DIEP, MS-TRAM [Muscle-Sparing Transverse Rectus Abdominis Myocutaneous], SIEA [Superficial Inferior Epigastric Artery], free TRAM, pedicled TRAM), gluteal region (ie, SGAP, IGAP), thigh (ie, TUG, VUG , DUG, PAP), or the back (ie, LD [Latissimus Dorsi], TDAP, LAP [Lumbar Artery Perforator])".

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MRI Breast Indications (BR-5)

Guideline

MRI Breast Indications (BR-5.1)
Breast Implant Evaluation (BR-5.2)
Procedure-Related Breast Imaging (BR-5.3)

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MRI Breast Indications (BR-5.1)

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Criteria

MRI Breast Considerations

- MRI Breast Unilateral is **NOT** clinically supported (except as specified below).
- See **Procedure-Related Breast Imaging (BR-5.3)** for MRI-guided breast biopsy.
- See **Breast Cancer (ONC-11)** in the Oncology Imaging Guidelines for imaging indications related to breast cancer as follows:
  - Breast Cancer - Initial work-up/Staging
  - Breast Cancer - Restaging/Recurrence
  - Breast Cancer - Surveillance/Follow-up
  - Annual screening with prior history of breast cancer

MRI Following a Screening Mammogram and/or US in Asymptomatic Individuals

- MRI Breast is considered medically necessary when requested by the treating provider or the radiologist to complete the screening process following an abnormal mammogram (BI-RADS® 3 or higher) or an inconclusive mammogram (BI-RADS® 0).
  - When medical necessity is met with one of the indications in the bullet above, any **ONE** of the following codes are acceptable:
    - CPT® 77046 (MRI Breast Unilateral without contrast)
    - CPT® 77047 (MRI Breast Bilateral without contrast)
    - CPT® 77048 (MRI Breast Unilateral without and with contrast)
    - CPT® 77049 (MRI Breast Bilateral without and with contrast)
    - HCPCS C8903 (MRI Breast Unilateral with contrast)
    - HCPCS C8905 (MRI Breast Unilateral without and with contrast)
    - HCPCS C8906 (MRI Breast Bilateral with contrast)
    - HCPCS C8908 (MRI Breast Bilateral without and with contrast)
- MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary for documented histopathologic discordance between core-needle biopsy findings and imaging findings (before consideration for surgical management vs. observation).
  - Discordance exists when the biopsy result does not adequately explain the abnormal (BI-RADS® 4 or 5) findings on mammogram and/or ultrasound.
- MRI Breast is considered **NOT** medically necessary as a substitute for mammogram.
  - Mammogram is able to be safely completed in those with breast implants.

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- For symptomatic individuals, please refer to the following appropriate condition-based guideline:
  - **Nipple Discharge/Galactorrhea (BR-6.1)**
  - **Breast Pain (Mastodynia) (BR-7.1)**
  - **Breast Imaging in Males (BR-9.1)**
  - **Breast Mass (BR-14.1)**
  - **Skin Changes (BR-15.1)**
  - **Nipple Inversion/Retraction (BR-16.1)**
  - **Phyllodes Tumor/Cystosarcoma Phyllodes (BR-17.1)**
- See **MRI BI-RADS® 3** section for lesions categorized as BI-RADS® 3 on MRI.

MRI BI-RADS® 3

- A probably benign lesion on **MRI** (MRI BI-RADS® 3) should undergo repeat MRI in 6 months.
  - If repeat imaging remains MRI BI-RADS® 3, then repeat at 12 months, 18 months, and 24 months from the date of the initial imaging.
    - After 2 years of stability, the finding should be assessed as benign (Cat 2).
  - If repeat imaging is BI-RADS® 1 or 2, then imaging reverts to routine per individual's risk profile. See **Risk Factors** section.

Risk Factors

- Routine MRI Breast following bilateral mastectomy is considered **NOT** medically necessary (even if high-risk screening criteria may otherwise be met, even if there is suspected or known residual breast tissue, and/or even if nipple-sparing mastectomy was done).
- Annual MRI Breast screening with MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary for individuals meeting the high-risk criteria in the table below (for male breast imaging, please see **Breast Imaging in Males (BR-9.1)**):

High-Risk Indications	Age at which screening can start**
Genetic Mutations:*	
TP53 (Li-Fraumeni)	20 OR at the age of the youngest family member diagnosed with breast cancer
BRCA 1 or 2	25

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High-Risk Indications	Age at which screening can start**
STK11 (Peutz-Jeghers syndrome [PJS]), PTEN Mutation (Cowden Syndrome/*PTEN* Hamartoma Tumor Syndrome), CDH1, NF1, PALB2, ATM, CHEK2	30**
BARD1, RAD51C, RAD51D	40**
Personal History:	
Personal history of ADH, ALH, or LCIS (not FEA)	At diagnosis but not prior to age 25
Personal history of breast cancer at or before the age of 50	At diagnosis
Family history:	
Two or more first-degree relatives with breast or ovarian cancer	40**
One first-degree relative with breast cancer or ovarian cancer that was diagnosed less than or equal to age 50	40**
One first-degree relative with bilateral breast cancer, or both breast and ovarian cancer	40**
A first- or second-degree male relative (father, brother/half-brother, uncle, grandfather) diagnosed with breast cancer	40**
Elevated clinical lifetime-risk:	
Clinical lifetime-risk estimated at greater than or equal to 20% as calculated by one of the following models: • Tyrer-Cuzick (International Breast Cancer Intervention Study (IBIS)) • The Breast Cancer Surveillance Consortium (BCSC) • Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm (BOADICEA)/CanRisk • BRCAPRO Model	40**
Personal history of radiation therapy when younger than age 30:	
Radiation to chest, whole lung, mediastinum, axilla, mantle (including mini mantle or extended mantle), total or subtotal lymphoid irradiation or total body irradiation (TBI)	25 or 8 years after completion of radiation therapy (*whichever comes later*)

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High-Risk Indications	Age at which screening can start**
Breast Density*:	
Heterogeneously Dense Breasts (Category C) or Extremely Dense Breasts (Category D) with no additional risk factors	40

*The following have unknown or insufficient evidence of breast cancer risk and additional MRI screening is considered **NOT** medically necessary at this time: MSH2, MLH1, MSH6, PMS2, EPCAM, NBN, genetic variants of unknown significance, and genetic variants favoring polymorphism. Any gene mutation not specified in the table above has not currently been found to have sufficient evidence to support surveillance with MRI.

OR 10 years prior to the age of diagnosis of the youngest relative with breast cancer (first-, second-, and third-degree relatives) *whichever comes first*, **but not before age 25

*** Breast density should be based on the most recently available mammogram. If the breast is no longer dense and that was the only high-risk factor, MRI is no longer considered medically necessary for routine screening.

Background and Supporting Information

- myRisk® Hereditary Cancer (Myriad Genetics, Inc.) is not accepted as a risk calculator to determine high-risk for breast cancer, although the genetic testing results and Tyrer-Cuzick score can be used (NCCN, 2026b).

Evidence Discussion

General Considerations

Yeh et al. (2025) clearly stated that regardless of risk category, "because screening mammography decreases breast cancer mortality, screening mammography or screening DBT [digital breast tomosynthesis] is still performed in females undergoing supplemental screening studies".

Bennett et al. (2026) noted that mammography was an imaging option for individuals with breast implants.

High-Risk Indications

NCCN (2026c) noted very strong evidence of an association between the TP53 gene and development of breast cancer. It noted the risk percentage to be greater than 60%. Because of this close association, annual screening with MRI breast is recommended,

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beginning as early as 20 years of age or at the age of the youngest family member diagnosed with breast cancer.

The NCCN (2026b) has recommended annual breast MRI for those with ADH, ALH or LCIS. Screening could begin at the age of diagnosis of ADH or lobular neoplasia, but not before the age of 25. A 2024 systematic review and meta analysis by Baker et al. examined the risk of subsequent development of breast cancer following diagnosis of various high-risk lesions. One of the types of lesions was flat epithelial atypia (FEA). FEA showed a modelled incidence of breast cancer at 10 years of 7.2%. This was compared to atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia (ALH) which showed an estimated incidence of breast cancer at 10 years of 13.9% and 15.4% respectively (Baker et al., 2024). Due to a paucity of supporting evidence at this time, it is not recommended that FEA be considered to be a pathology for which supplemental screening breast MRI is recommended. NCCN (2026b) noted FEA as a benign finding not requiring routine excision and recommended that following diagnosis, the individual return to routine screening if there are no additional indications for high-risk screening with breast MRI.

BRCA1 is associated with a risk of developing breast cancer greater than 60% and *BRCA2* is associated with a 55% to 69% risk. (NCCN, 2026c). The NCCN guidelines (2026c) recommended starting MRI screening at the age of 25.

STK11 mutations are associated with a 32%-54% risk of developing primary breast cancer (NCCN, 2026c). The *CDH1* mutation confers a risk of 37% to 55% and the *PALB2* mutation confers a risk of 32%-53% of developing breast cancer (NCCN, 2026c). NCCN guidelines (2026c) recommended starting MRI screening in these individuals at age 30. For individuals with NF1, the risk of developing breast cancer is 20%-40%. NCCN guidelines (2026c) recommended considering annual MRI screening from ages 30-50. *ATM* mutations are associated with a 21%-24% risk of developing breast cancer, and *CHEK2* mutations, similarly, are associated with a 23%-27% risk (NCCN, 2026c). NCCN guidelines (2026c) suggested consideration of annual breast MRI starting at age 30-35 in both of these groups. Both the *CHEK2* and *ATM* mutations are considered to be genes of intermediate penetrance (Pal et al., 2026). *PTEN* mutations are associated with a 40%-60% risk of developing breast cancer (NCCN, 2026c). NCCN (2026c) and ESMO guidelines recommended starting annual MRI at the age of 30 (NCCN, 2026c; Sessa, 2023).

BARD1 is associated with a 17% to 30% risk while *RAD51C* and *RAD51D* are each associated with an approximate 20% risk of developing breast cancer (NCCN, 2026c). The NCCN guidelines (2026c) recommended considering an annual breast MRI starting at age 40.

Mutations and variants with a less than 15% absolute risk of developing breast cancer lack sufficient evidence to suggest that screening MRI would be beneficial. Therefore,

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the NCCN (2026c) did not recommend screening MRI for these individuals unless other risks are present.

The ACR Appropriateness Criteria® for "Female Breast Cancer Screening" had noted that "some females with a personal history of breast cancer may also fit into the high-risk category, particularly those diagnosed before 50 year of age..." (Yeh et al., 2025). They also went on to state that these women may have a greater than 20% estimated lifetime risk of another breast cancer diagnosis (Yeh et al., 2025). The NCCN also noted that MRI Breast for screening is recommended annually for individuals diagnosed with breast cancer at or before age 50 (NCCN, 2026a) who have not undergone bilateral mastectomy (see the "**Postmastectomy Imaging**" section below) (Heller et al., 2020).

Per NCCN recommendations (2026b), BRCAPRO, Tyrer- Cuzick, Breast Cancer Surveillance Consortium (BCSC), and Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm (BOADICEA)/CanRisk are appropriate models used to calculate clinical lifetime-risk.

The NCCN (2026b) has issued guidance that recommended individuals with extremely dense breast tissue on mammogram begin screening with MRI Breast at age 50, but also noted that "consideration can be given to start at age 40 years based on individual risk factors". The Updated Recommendations from ACR also addressed the use of MRI Breast in individuals with dense breast tissue for supplemental screening. They did not differentiate between heterogeneously and extremely dense breasts in their recommendation and instead, recommended screening for those with dense breasts starting at age forty and possibly earlier if there are other risk factors (Monticciolo, 2023). ACR considers dense breasts to be heterogeneously dense (Category C) and extremely dense (Category D) (Expert Panel on Breast Imaging et al., 2025). The Federal Drug Administration (FDA) began requiring the reporting of breast density as part of the mammogram reports as of September 2024 (NCCN, 2026b). NCCN (2026b) pointed out that "...the presence of dense tissue is not abnormal and can change over time". This change in breast density over time was also seen in a large retrospective cohort study by Park et al. (2024). Because of this tendency to change, breast density as a stand alone risk factor is not fixed such as with other risk factors like family history and genetic mutations. Instead, the risk factor of breast density should be re-evaluated based on the most recently available mammogram report.

MRI utilizes a magnetic field and radio waves with computer processing to produce detailed images whereas CT uses ionizing radiation. Radiation dosages vary based on many factors and can be harmful to tissues. Thus, from a radiation safety perspective, MRI should be utilized when appropriate and supported by existing literature; however, the NCCN also acknowledged potential harms of MRI use, such as increased false positives, increased recall, and increased benign biopsies (NCCN, 2026b).

Postmastectomy Imaging

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According to the ACR Appropriateness Criteria® for "Imaging after Mastectomy and Breast Reconstruction", there is not enough evidence to support MRI imaging for breast cancer screening following a bilateral mastectomy (Heller et al., 2020). In addition, in a study by Weed et al. (2024), it was found that "the use of surveillance MRI after NSM [nipple-sparing mastectomy] lead to increased rates of biopsy without improvement in overall survival in our study". The American Society of Clinical Oncology (ASCO) recently published an updated guideline which addressed surveillance imaging after treatment of breast cancer. For individuals who have had bilateral mastectomy with or without reconstruction, it was recommended to follow with chest wall exams (Nahleh et al., 2026). The ACR also noted, "the rates of locoregional recurrence after mastectomy for DCIS [ductal carcinoma in situ] range from 1% to 3% after 10 years. Most local recurrences are invasive breast cancer detected clinically as a chest wall mass" (Kuzmiak et al., 2025).

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Breast Implant Evaluation (BR-5.2)

BR.ID.0005.2.U
v1.0.2027

Criteria

Breast Implant Imaging

- Breast MRI is considered **NOT** medically necessary for evaluation of capsular contracture given the paucity of evidence that MRI imaging either changes management or improves outcome.
- Imaging for routine surveillance and/or suspected rupture of breast implants is dependent upon the type of implant. Please see below.

SALINE

Asymptomatic Screening in Females or Transfeminine Individuals

- For all ages, routine imaging is considered **NOT** medically necessary.

Exam Equivocal for Rupture in Females or Transfeminine Individuals

- If less than 30 years old, breast ultrasound (CPT® 76641 or CPT® 76642) is considered medically necessary.
- If 30 years old or older, breast ultrasound (CPT® 76641 or CPT® 76642) or diagnostic mammogram is considered medically necessary.
- If breast ultrasound or diagnostic mammogram results are indeterminate for saline implant rupture, additional imaging with MRI Breast Bilateral without contrast (CPT® 77047) is considered medically necessary for further evaluation.

SILICONE

Asymptomatic Screening in Females or Transfeminine Individuals

- For all ages, if it is less than 5 years since the implants were placed, routine advanced imaging is considered **NOT** medically necessary.
- For all ages, if it has been 5 years or more since the implants were placed, breast ultrasound (CPT® 76641 or CPT® 76642) is considered medically necessary.
  - Further evaluation with MRI Breast Bilateral without contrast (CPT® 77047) is considered medically necessary if the breast ultrasound is indeterminate.
  - Repeat breast ultrasounds (CPT® 76641 or CPT® 76642) can be done every 2 to 3 years after initial negative imaging.

Exam Equivocal for Rupture in Females or Transfeminine Individuals

- For all ages, breast ultrasound (CPT® 76641 or CPT® 76642) or diagnostic mammogram or MRI Breast Bilateral without contrast (CPT® 77047) is considered medically necessary.

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- If breast ultrasound (CPT® 76641 or CPT® 76642) or diagnostic mammogram results are indeterminate for silicone implant rupture, additional imaging with MRI Breast Bilateral without contrast (CPT® 77047) is considered medically necessary for further evaluation.

Evidence Discussion

Breast Implant Evaluation

Noreña-Rengifo et al. (2022) discussed that capsular contracture is considered to be a clinical diagnosis. This is also supported by Bennett et al. (2026) who wrote, "capsular contracture is a clinical diagnosis made based on the patient's symptoms". As such, MRI of the breast to evaluate for capsular contracture is considered not medically necessary.

Saline implant rupture is more clinically apparent than other types of implants since the body readily resorbs the leaking saline, resulting in a loss of volume in the breast on exam (Bennett, et al., 2026). Thus, there is no role for MRI Breast(s) in asymptomatic women with saline implants (Chetlan et al., 2023). However, if the exam is equivocal for rupture, initial imaging supported by the American College of Radiology (ACR) includes diagnostic mammogram and/or ultrasound in individuals greater than 30 years old. In those less than 30 years of age, diagnostic mammogram is not typically performed and ultrasound is the initial imaging of choice (Bennett et al., 2026).

An exam is not as reliable for detecting the rupture of silicone implants as it is for saline implants. Therefore, if an exam is equivocal for rupture, imaging with a combination of ultrasound, mammogram, and/or MRI of the breast (with the choice of mammogram depending upon age) is appropriate (U.S. Food and Drug Administration, 2020).

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Procedure-Related Breast Imaging (BR-5.3)

BR.ID.0005.3.A
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Criteria

MRI-Guided Breast Biopsy and Intraoperative Placement of Breast Localization Device

- MRI-guided breast biopsy (CPT® 19085) includes the imaging component and the needle placement under MR guidance; CPT® 77021 MR guidance for needle placement is **NOT** an appropriate code to bill for a breast biopsy.
  - Additional lesions should be billed using CPT® 19086.
  - This program does not manage CPT® codes 19085 or 19086.
- Intraoperative placement of a breast localization device includes the imaging component. For this reason, CPT® 77021, MR guidance for needle placement, is **NOT** an appropriate code to bill for pre-operative localization.
  - Diagnostic MRI Breast is considered **NOT** medically necessary for localization.

Seed Placement

- CPT® codes 19287 and 19288 are used for seed placement with MR guidance and include the imaging component. For this reason, CPT® 77021, MR guidance for needle placement, is **NOT** an appropriate code to bill for seed placement.

Post-Biopsy or Attempted Biopsy Imaging

- For lesions initially seen on MRI Breast and that have benign and non-specific, equivocal or uncertain histology (based on a stereotactic, MRI-guided, or US-directed breast biopsy), an MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary at least 6 months after the biopsy to document successful lesion sampling.
- MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary 6 months after attempted MRI-guided breast biopsy, when recommended by a radiologist, due to targeted lesion not visualized at the time of the procedure.

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BI-RADS® 4 or 5

- BI-RADS® 4 or 5 lesions found on diagnostic mammogram or ultrasound performed for breast symptoms should be biopsied. MRI is not a substitute for biopsy.

Evidence Discussion

Post-Biopsy or Attempted Biopsy Imaging

A study conducted by Pinnamaneni et al. (2018) showed that of the 89 biopsies that were canceled secondary to nonvisualization, 74% of lesions resolved by 6 month follow-up, however 1.9% yielded carcinoma at the 6 month follow-up. Pinnamaneni et al. (2018) concluded that, "the majority of canceled MRI-guided biopsy lesions resolved on later follow-up; however, because of the small possibility of a missed malignancy, follow-up MRI imaging at 6 months is recommended".

The initial evaluation of individuals who present with a suspicious finding on breast imaging or a palpable mass upon examination involves a biopsy (percutaneous or surgical if percutaneous is not feasible). If the biopsy results are discordant with the imaging findings, an MRI for further evaluation is supported (Sanders et al., 2019).

BI-RADS® 4 or 5

When a BI-RADS® 4 lesion is found on mammogram or ultrasound, the next step should be a biopsy. When a percutaneous biopsy is unable to be performed, then the next step should be an excisional biopsy rather than a breast MRI (Reig et al., 2023). Reig et al. (2023) noted this recommendation as part of "results of a large multicenter trial that showed the sensitivity of MRI at 88.1% in patients with BI-RADS 4 or 5 mammographic or US findings". This recommendation is also supported by the NCCN (2026b) for BI-RADS® 4 or 5 mammogram and/or ultrasound findings.

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Nipple Discharge/ Galactorrhea (BR-6)

Guideline

Nipple Discharge/Galactorrhea (BR-6.1)

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Nipple Discharge/Galactorrhea (BR-6.1)

BR.DC.0006.1.A
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Criteria

Physiologic nipple discharge (non-spontaneous or multi-duct, no suspicious findings on clinical exam)

- For individuals less than 40 years old, imaging is considered **NOT** medically necessary.
- For individuals 40 years old and older, a screening mammogram is considered medically necessary.
- If there is concern for a prolactinoma, please refer to **Pituitary, Sella, Hypothalamus (HD-19.1)**.

Pathologic nipple discharge (spontaneous, unilateral, single duct, clear or bloody, persistent and reproducible)

- For individuals less than 30 years old, breast ultrasound (CPT® 76641 or CPT® 76642) with or without a diagnostic mammogram is considered the medically necessary initial imaging.
  - If the breast ultrasound and diagnostic mammogram (if performed) are a BI-RADS® category 1-3, a MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary.
  - If the breast ultrasound or diagnostic mammogram (if performed) are a BI-RADS® category 4 or 5, a MRI Breast is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.
- For individuals 30 years old and older, breast ultrasound (CPT® 76641 or CPT® 76642) and diagnostic mammogram are considered the medically necessary initial imaging.
  - If the breast ultrasound and diagnostic mammogram are a BI-RADS® category 1-3, a MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary.
  - If the breast ultrasound or diagnostic mammogram are a BI-RADS® category 4 or 5, a Breast MRI is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.

Evidence Discussion

No specific breast imaging is used for evaluation of physiologic discharge, other than usual screening mammogram in the appropriate age group (NCCN, 2026b). In cases where there is concern for an endocrine etiology such as with bilateral milky discharge,

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the evaluation should be medical, including endocrine specific lab studies (NCCN, 2026b).

In a retrospective study by Chung et al. (2023) which evaluated 320 patients from a single institution, it was found that "the combination of digital mammography and ultrasound had a 93% sensitivity and a 98% NPV [negative predictive value], while contrast enhanced MRI (CE-MRI) had a 100% sensitivity and a 100% NPV for malignancy". This finding supported the stepped approach to imaging put forth by NCCN (2026b) which includes proceeding with a contrast enhanced breast MRI when the ultrasound and/or mammogram (depending on age) does not explain the cause of the nipple discharge. Because of the high negative predictive value of this imaging approach, it is possible that this approach may serve as an alternative to surgery when no suspicious findings are seen (Reig et al., 2023).

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Breast Pain (Mastodynia) (BR-7)

Guideline

Breast Pain (Mastodynia) (BR-7.1)

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Breast Pain (Mastodynia) (BR-7.1)

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Criteria

- Evaluation of breast pain requires a history and physical exam.
  - When breast pain is present with another breast symptom such as nipple discharge, skin change(s), or palpable mass, the imaging should be done in accordance with the accompanying symptom's guideline rather than this guideline for breast pain.
- If pain is cyclical and/or generalized across more than one quadrant of the breast, an up-to-date screening mammogram is considered medically necessary.
- If pain is focal and the individual is 30 years old or older, diagnostic mammogram and breast ultrasound (CPT® 76641 or CPT® 76642) are considered medically necessary as the initial imaging.
- If pain is focal and the individual is less than 30 years old, breast ultrasound (CPT® 76641 or CPT® 76642) is considered medically necessary as the initial imaging.
- Advanced imaging is considered **NOT** medically necessary in individuals with breast pain or breast abscesses given the paucity of evidence that MRI imaging either changes management or improves outcome.

Evidence Discussion

In a study of 2820 individuals presenting with breast pain, the cancer detection rate in those who underwent breast imaging was found to be 0.09%, 1% and 1.4% in individuals under the age of 40, 40-49 and 50 years of age or older, respectively (Komenaka et al., 2022). A retrospective cohort study conducted by van Leperen et al. (2026) reviewed electronic health records of women 30 years of age or older who presented breast symptoms or were diagnosed with breast cancer from the years 2014 to 2021. In their conclusion, they noted "isolated mastalgia was not associated with breast cancer. However, mastalgia occurring in combination with other breast-related symptoms may indicate a higher risk" (van Leperen et al., 2026). Given these data, in the absence of other factors, the ACR recommended against the use of MRI in individuals with breast pain (Expert Panel on Breast Imaging et al., 2018a).

Breast abscesses can present with a variety of etiologies. In a review of various inflammatory diseases of the breast, Scott (2022) pointed to ultrasound as the appropriate initial imaging. It was also noted that while diagnostic mammogram can be done, it may not be very beneficial in all etiologies (Scott, 2022). A review of the "American Society of Breast Surgeons, Society of Breast Imaging, and College of American Pathology 2025 Guidelines for the Management of Infectious

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and Inflammatory Lesions of the Breast" also only noted the use of ultrasound and mammography in their imaging recommendations (Mitchell et al., 2026).

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Alternative Breast Imaging Approaches (BR-8)

Guideline

Alternative Breast Imaging Approaches (BR-8.1)

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Alternative Breast Imaging Approaches (BR-8.1)

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Criteria

Molecular Breast Imaging (MBI)

- Molecular Breast Imaging (CPT® 78800) is considered medically necessary in individuals who meet criteria for breast cancer screening with MRI (per **BR-5**) but for whom MRI is contraindicated.
  - See **MRI Following a Screening Mammogram and/or US in Asymptomatic Individuals** and **Risk Factors** below.

MRI Following a Screening Mammogram and/or US in Asymptomatic Individuals

- MRI Breast is considered medically necessary when requested by the treating provider or the radiologist to complete the screening process following an abnormal mammogram (BI-RADS® 3 or higher) or an inconclusive mammogram (BI-RADS® 0).

Risk Factors

- Routine MRI Breast following bilateral mastectomy is considered **NOT** medically necessary (even if high-risk screening criteria may otherwise be met, even if there is suspected or known residual breast tissue, and/or even if nipple-sparing mastectomy was done).
- Annual MRI Breast screening with MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary for individuals meeting the high-risk criteria in the table below (for male breast imaging, please see **Breast Imaging in Males (BR-9.1)**):

High-Risk Indications	Age at which screening can start**
Genetic Mutations:*	
TP53 (Li-Fraumeni)	20 OR at the age of the youngest family member diagnosed with breast cancer
BRCA 1 or 2	25

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High-Risk Indications	Age at which screening can start**
STK11 (Peutz-Jeghers syndrome [PJS]), PTEN Mutation (Cowden Syndrome/*PTEN* Hamartoma Tumor Syndrome), CDH1, NF1, PALB2, ATM, CHEK2	30**
BARD1, RAD51C, RAD51D	40**
Personal History:	
Personal history of ADH, ALH, or LCIS (not FEA)	At diagnosis but not prior to age 25
Personal history of breast cancer at or before the age of 50	At diagnosis
Family history:	
Two or more first-degree relatives with breast or ovarian cancer	40**
One first-degree relative with breast cancer or ovarian cancer that was diagnosed less than or equal to age 50	40**
One first-degree relative with bilateral breast cancer, or both breast and ovarian cancer	40**
A first- or second-degree male relative (father, brother/half-brother, uncle, grandfather) diagnosed with breast cancer	40**
Elevated clinical lifetime-risk:	
Clinical lifetime-risk estimated at greater than or equal to 20% as calculated by one of the following models: • Tyrer-Cuzick (International Breast Cancer Intervention Study (IBIS)) • The Breast Cancer Surveillance Consortium (BCSC) • Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm (BOADICEA)/CanRisk • BRCAPRO Model	40**
Personal history of radiation therapy when younger than age 30:	
Radiation to chest, whole lung, mediastinum, axilla, mantle (including mini mantle or extended mantle), total or subtotal lymphoid irradiation or total body irradiation (TBI)	25 or 8 years after completion of radiation therapy (*whichever comes later*)

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High-Risk Indications	Age at which screening can start**
Breast Density*:	
Heterogeneously Dense Breasts (Category C) or Extremely Dense Breasts (Category D) with no additional risk factors	40

*The following have unknown or insufficient evidence of breast cancer risk and additional MRI screening is considered **NOT** medically necessary at this time: MSH2, MLH1, MSH6, PMS2, EPCAM, NBN, genetic variants of unknown significance, and genetic variants favoring polymorphism. Any gene mutation not specified in the table above has not currently been found to have sufficient evidence to support surveillance with MRI.

OR 10 years prior to the age of diagnosis of the youngest relative with breast cancer (first-, second-, and third-degree relatives) *whichever comes first*, **but not before age 25

*** Breast density should be based on the most recent mammogram. If the breast is no longer dense and that was the only high-risk factor, MRI is no longer considered medically necessary for routine screening.

Other Alternative Breast Imaging Techniques

Other alternative breast imaging techniques may have FDA approval, but they remain investigational with respect to **BOTH** screening and diagnosis of breast cancer. These include the following:

- Nuclear breast imaging, including:
  - Scintimammography (HCPCS S8080, CPT® 78800, or CPT® 78801)
  - Breast specific gamma imaging (BSGI) (HCPCS S8080, CPT® 78800, or CPT® 78801)
- PET Mammography (PEM, generally reported with CPT® 78811)
- CT Breast (CPT® 0633T, CPT® 0634T, CPT® 0635T, CPT® 0636T, CPT® 0637T, or CPT® 0638T)
- Cone Beam CT Breast (CPT® 76497, CPT® 0633T, CPT® 0634T, CPT® 0635T, CPT® 0636T, CPT® 0637T, or CPT® 0638T)

Evidence Discussion

There is limited data regarding the use of MBI in individuals of average breast cancer risk. However, in those classified as high-risk (lifetime risk greater than or equal to 20%),

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the NCCN guideline (2026b) supported MBI for those who met criteria for supplemental breast MRI, but who could not undergo MRI.

There is no data to support other alternative breast imaging techniques which are delegated for review by EviCore. They are not supported for screening by the ACR, NCCN, or other breast society guidelines. As more data becomes available, the guidelines will be updated accordingly.

In a review by Peterson, et al. (2023), it was recommended that molecular breast imaging not be used in pregnancy due to the possibility of radiation exposure to the fetus from the radiopharmaceutical agent which is known to cross the placenta. MBI should not be used in pregnancy unless the requesting physician has determined that the benefits outweigh the risks.

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Breast Imaging in Males (BR-9)

Guideline

Breast Imaging in Males (BR-9.1)

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Breast Imaging in Males (BR-9.1)

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Criteria

MRI of the male breast is considered **NOT** medically necessary given the paucity of evidence supporting its efficacy in male breast disease.

Screening for Males at Increased Risk for Breast Cancer

- A clinical breast exam every 12 months is considered medically necessary.
- Annual mammogram, especially for those with *BRCA2* or *PALB2* P/LP variants in whom the lifetime risk of breast cancer is up to 7%, starting at age 50 or 10 years before the earliest known male breast cancer in the family, is considered medically necessary.

Symptomatic Male Breast Imaging

- Diagnostic Mammogram and/or breast ultrasound (CPT® 76641 or CPT® 76642) is considered medically necessary for evaluation of the symptomatic male breast and the preferred method depends on age and the suspected etiology of disease.

Evidence Discussion

Breast cancer management in cis-gender males is similar to females. NCCN guidelines recommended that, for males presenting with bilateral breast enlargement consistent with gynecomastia or pseudogynecomastia, reassurance with clinical management of the presumed cause (e.g., drug-induced, hypogonadism, hyperthyroidism, etc.) is all that was needed. For males presenting with palpable symptoms not explained by gynecomastia, or for those presenting with bloody nipple discharge, work-up should include mammography and ultrasound, followed by core needle biopsy if these studies should be found to be BIRADS® category 4-5 (NCCN, 2026b). A study by Gao et al. (2019) noted that there is a high sensitivity to mammography in males related to men generally having a small amount of fibroglandular tissue.

The NCCN (2026c) noted support of annual mammogram for cis-gender males, noting it is especially recommended in those "with *BRCA2* P/LP variants in whom the lifetime risk of breast cancer is up to 7%, starting at age 50 or 10 years before the earliest known male breast cancer in the family (whichever comes first)". In addition, it suggested that men with a *PALB2* mutation undergo similar screening. A 2019 study by Gao et al. noted the importance of screening mammography in men at high-risk for breast cancer. They found that in this population, screening with mammogram "allowed early cancer diagnosis and yielded a cancer detection rate of 18 per 1000 examinations,

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which is higher than cancer yield among women with average risk of 3-5 per 1000 examinations" (Gao et al., 2019).

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Breast Evaluation in Pregnant or Lactating Females (BR-10)

Guideline

Breast Evaluation in Pregnant or Lactating Females (BR-10.1)

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Breast Evaluation in Pregnant or Lactating Females (BR-10.1)

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Criteria

- Breast ultrasound (CPT® 76641 or CPT® 76642) is first-line imaging in pregnant and lactating females.
- If pregnant/lactating female has a palpable mass **OR** has persistent unilateral bloody nipple discharge and the ultrasound is negative or suspicious, follow with diagnostic mammogram.
- IV Gadolinium is required with MRI to evaluate breast parenchyma but is relatively contraindicated in pregnancy. Biopsy, rather than advanced imaging, is recommended after inconclusive mammogram and ultrasound.
- MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is supported for evaluation in lactating women if criteria are met otherwise (see **BR-5.1**).
- For imaging requests related to a breast abscess, please see **Breast Pain (Mastodynia) (BR-7.1)**.
- Imaging should not be done in lieu of a percutaneous core needle biopsy in pregnant/lactating females if a percutaneous core needle biopsy is otherwise considered medically necessary

Evidence Discussion

According to Dogan et al. (2026), "breast symptoms are common during lactation and often reflect a spectrum of physiologic, infectious, inflammatory, or neoplastic processes that can overlap in presentation...These conditions may present with similar clinical findings such as a palpable mass, focal pain, or erythema, necessitating careful imaging evaluation to guide diagnosis and management". Because of this, diagnostic imaging in this population is of significant importance (Dogan et al., 2026).

Advanced imaging with breast MRI has a limited role in pregnant women. The IV administration of gadolinium is relatively contraindicated due to the fact that gadolinium-based contrast agents (GBCAs) are known to cross the placenta and may pose an elevated risk to the fetus though there are still many uncertainties in this area (American College of Radiology [ACR], 2026). Per the ACR (2026), "a decision to administer GBCAs to a pregnant woman should only be made when there is the potential for significant clinical benefit that outweighs the unknown risk of fetal exposure and should be the product of discussion that involves the referring provider and patient". If there is

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clinical suspicion of malignancy, a biopsy is the next step in evaluation (Salkowski et al., 2025).

The American Society of Breast Surgeons (2024) put forth guidance surrounding the topic of oncolactation. In these recommendations, they clearly stated that "percutaneous core needle biopsy is safe in pregnancy and lactation".

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Transgender Breast Cancer Supplemental Screening (BR-12)

Guideline

Transgender Breast Cancer Supplemental Screening (BR-12.1)

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Transgender Breast Cancer Supplemental Screening (BR-12.1)

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Criteria

- Annual supplemental screening with breast ultrasound (CPT® 76641 or CPT® 76642) **AND/OR** MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary for the following:
  - Transmasculine (female-to-male) with **ALL** of the following risk factors:
    - Reduction mammoplasty or no chest surgery
    - Age ≥25
    - High-risk (≥20% lifetime risk)
- Annual breast ultrasound and/or MRI Breast, in addition to mammogram, for breast cancer screening is considered **NOT** medically necessary in any other scenarios, including **ANY** of the following:
  - Transfeminine (male-to-female)
  - Transmasculine (female-to-male), who have had bilateral mastectomies
  - Transmasculine (female-to-male), who have **NOT** had mastectomies **AND** are at average risk or intermediate risk
- Acceptable models of calculating clinical lifetime-risk include the following: Tyrer-Cuzick (IBIS), the Breast Cancer Surveillance Consortium (BCSC), Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm (BOADICEA)/CanRisk, or BRCAPRO.

Evidence Discussion

A number of studies have found that transgender individuals who have transitioned from female to male have the same risk of developing breast cancer as their cis-gendered female counterparts (Sterling & Garcia, 2020; Clarke et al., 2022; Expert Panel on Breast Imaging et al., 2021a). As such, those who still have breast tissue (i.e., have only undergone reduction mammoplasty or no chest surgery), should be screened similarly to cis-gendered women.

The ACR Appropriateness Criteria® recommended the use of ultrasound and/or MRI for individuals who are at intermediate to high risk based on either having a lifetime risk greater than or equal to 20%, a personal history of breast cancer, lobular neoplasia or atypia, chest wall irradiation, or have a genetic predisposition to developing breast cancer (Expert Panel on Breast Imaging et al., 2021a). The ACR, however, recommended transmasculine (female-to-male) individuals start screening earlier than

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their cis-gendered counterparts (starting at 25-30 years of age) (Expert Panel on Breast Imaging et al., 2021a).

For transmasculine individuals who are at low to average risk, mammography alone is sufficient (Sterling & Garcia, 2020; Clarke et al., 2022; Expert Panel on Breast Imaging et al., 2021a). Individuals who have had bilateral mastectomies have minimal residual breast tissue, such that breast cancer screening using imaging is not medically necessary (Sterling & Garcia, 2020; Clarke et al., 2022; Expert Panel on Breast Imaging et al., 2021a).

The ACR (Expert Panel on Breast Imaging et al., 2021a) found insufficient evidence to support the use of routine MRI screening in transfeminine (male-to-female) individuals, regardless of duration of hormone use and/or genetic factors. Transfeminine individuals who would otherwise be considered "high risk" based on personal or family history may consider annual mammography. Similarly, mammography may be appropriate in transfeminine individuals who have taken feminizing hormones for more than 5 years (Expert Panel on Breast Imaging et al., 2021a).

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3D Rendering (BR-13)

Guideline

3D Rendering (BR-13.1)

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3D Rendering (BR-13.1)

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Criteria

- 3D rendering (CPT® 76376 or CPT® 76377) should **NOT** be used in conjunction with **ANY** 3D mammography code.
- 3D rendering (CPT® 76376 or CPT® 76377) is considered **NOT** medically necessary for breast ultrasound. It is commonly requested in conjunction with automated breast ultrasound (ABUS); there is no evidence to support its clinical usefulness.
- 3D rendering (CPT® 76376 or CPT® 76377) should **NOT** be used in conjunction with MRI Breast.

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Breast Mass (BR-14)

Guideline

Breast Mass (BR-14.1)

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Breast Mass (BR-14.1)

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Criteria

- MRI Breast is considered **NOT** medically necessary to determine biopsy recommendations for suspicious or indeterminate lesion(s) that can be readily biopsied on physical exam, such as palpable masses.
  - If biopsy establishes a diagnosis of benign phyllodes tumor, no additional surveillance imaging is needed. Please see **MRI Breast Indications (BR-5.1)** for supplemental imaging requirements.
  - If biopsy establishes a diagnosis of borderline phyllodes tumor, please see **Phyllodes Tumor/Cystosarcoma Phyllodes (BR-17.1)**.
  - If biopsy establishes a diagnosis of **malignant phyllodes** (cystosarcoma phyllodes), it should be treated as a soft tissue sarcoma. See **Sarcomas - Bone, Soft Tissue, and GIST (ONC-12)** in the Oncology Imaging Guidelines.
- For individuals 30 years old and older, diagnostic mammogram and breast ultrasound (CPT® 76641 or CPT® 76642) are considered medically necessary as the initial imaging.
  - If the breast ultrasound or diagnostic mammogram is a BI-RADS® category 4 or 5, a Breast MRI is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.
- For individuals less than 30 years old, breast ultrasound (CPT® 76641 or CPT® 76642) with or without diagnostic mammogram is considered medically necessary as the initial imaging.
  - If the breast ultrasound or diagnostic mammogram (if performed) is a BI-RADS® category 4 or 5, a Breast MRI is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.

Evidence Discussion

According to the ACR Appropriateness Criteria® for "Palpable Breast Masses" there is a paucity of evidence to support the use of MRI Breast in the evaluation of a palpable mass regardless of what the BI-RADS® is on mammogram (Expert Panel on Breast Imaging et al., 2023).

NCCN (2026b) guidance for imaging of a palpable breast mass supports the use of diagnostic mammogram and/or ultrasound (preferred modality is dependent on age).

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Imaging with BI-RADS® assessment of category 4 require biopsy. MRI is not supported prior to biopsy (Radswiki et al., 2023).

Imaging with BI-RADS® assessment of category 3 require short-term follow up imaging: at 6, 12, and 24 months with the original imaging modality (Weerakkody et al., 2025; NCCN, 2026b).

Phyllodes tumors fall into three distinct classifications- benign, borderline, or malignant. Each classification has distinctive follow-up recommendations. Benign phyllodes tumors are only recommended to have clinical follow-up after excisional biopsy (NCCN, 2026a).

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Skin Changes (BR-15)

Guideline

Skin Changes (BR-15.1)

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Skin Changes (BR-15.1)

BR.SC.0015.1.A
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Criteria

- Diagnostic mammogram with or without breast ultrasound (CPT® 76641 or CPT® 76642) is considered the medically necessary initial imaging.
  - If the diagnostic mammogram and breast ultrasound (if performed) are a BI-RADS® category 1-3, and there is continued suspicion for underlying malignancy, MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary.
  - If the diagnostic mammogram or breast ultrasound (if performed) is a BI-RADS® category 4 or 5, MRI Breast is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.
    - If a core needle biopsy is performed and is benign, a MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary.
- Advanced imaging is considered **NOT** medically necessary in individuals with breast abscesses.

Evidence Discussion

NCCN (2026b) guidance for imaging of skin changes of the breast supported the use of diagnostic mammogram with or without breast ultrasound as the initial imaging. Additional imaging with MRI Breast is appropriate for BI-RADS® 1, 2, or 3 on the initial imaging in the setting of suspicion for malignancy (NCCN, 2026b). The purpose of the imaging is to identify a potential biopsy target (Reig et al., 2023).

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Nipple Inversion/ Retraction (BR-16)

Guideline

Nipple Inversion/Retraction (BR-16.1)

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Nipple Inversion/Retraction (BR-16.1)

BR.NI.0016.1.A
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This guideline is only to be used when there is no palpable mass. If there is an associated palpable mass, please see **Palpable Mass (BR-14.1)**.

Criteria

Congenital/Life-Long

- If there are no recent changes, only standard screening is recommended.
- If there are recent changes, see **Acquired/New Onset** below.

Acquired/New Onset

- If nipple discharge is present, please see **Nipple Discharge/Galactorrhea (BR-6.1)**.
- If skin changes are present, please see **Skin Changes (BR-15.1)**.
- For individuals 30 years old and older, diagnostic mammogram and breast ultrasound (CPT® 76641 or CPT® 76642) are considered medically necessary for the initial imaging.
  - If the breast ultrasound and diagnostic mammogram are a BI-RADS® category 1, 2, or 3, but are clinically suspicious, MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary.
  - If the breast ultrasound or diagnostic mammogram is a BI-RADS® category 4 or 5, Breast MRI is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.
- For individuals less than 30 years old, breast ultrasound (CPT® 76641 or CPT® 76642) with or without diagnostic mammogram is considered medically necessary for the initial imaging.
  - If the breast ultrasound and diagnostic mammogram (if performed) are a BI-RADS® category 1, 2, or 3, but are clinically suspicious, a MRI Breast Bilateral without and with (CPT® 77049 or HCPCS C8908) is considered medically necessary.
  - If the breast ultrasound or diagnostic mammogram (if performed) is a BI-RADS® category 4 or 5, a Breast MRI is considered **NOT** medically necessary. Biopsy is recommended in these circumstances.

Evidence Discussion

NCCN (2026b) guidance for imaging of nipple inversion/retraction supported the use of diagnostic mammogram and/or breast ultrasound as the initial imaging (preferred

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modality is dependent on age). Additional imaging with MRI Breast is dependent on the BI-RADS® category of the initial imaging as well as level of clinical suspicion (NCCN, 2026b).

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Phyllodes Tumor/ Cystosarcoma Phyllodes (BR-17)

Guideline

Phyllodes Tumor/Cystosarcoma Phyllodes (BR-17.1)

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Phyllodes Tumor/Cystosarcoma Phyllodes (BR-17.1)

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Criteria

- If no tissue diagnosis has been performed, please refer to **Breast Mass (BR-14.1)**.
  - MRI Breast is considered **NOT** medically necessary prior to a core needle biopsy when there is suspicion of a phyllodes tumor.
  - If the biopsy is indeterminate or suspicious for a **benign** phyllodes tumor, the next step is an excisional biopsy and MRI Breast is considered **NOT** medically necessary.
- If the core needle or excisional biopsy establishes a diagnosis of a **benign** phyllodes tumor, no additional surveillance imaging is needed. Please see **MRI Breast Indications (BR-5.1)** for supplemental imaging requirements.
- If the core needle or excisional biopsy establishes a diagnosis of a **malignant phyllodes** (cystosarcoma phyllodes), it should be treated as a soft tissue sarcoma. See **Sarcomas - Bone, Soft Tissue, and GIST (ONC-12)** in the Oncology Imaging Guidelines.
- If the core needle or excisional biopsy is suspicious for or establishes a diagnosis of a **borderline** phyllodes tumor, MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary.
  - For confirmed **borderline** phyllodes tumors, MRI Breast Bilateral without and with contrast (CPT® 77049 or HCPCS C8908) is considered medically necessary every 6 months for 2 years and then annually through year 5.

Evidence Discussion

In a 2025 review by Rosenberger et al., it is noted that "pathologists can rarely differentiate a fibroadenoma from a PT [phyllodes tumor] by core biopsy alone, and therefore, they often report these core biopsy results as an FEL [fibroepithelial lesion]". Fibroepithelial lesions consist of both fibroadenomas and phyllodes tumors. Because of this, the recommendation by Rosenberger et al.(2025) is to proceed with an excision of the lesion.

Phyllodes tumors fall into three distinct classifications- benign, borderline, or malignant. Each classification has distinctive follow-up recommendations. Benign phyllodes tumors are only recommended to have clinical follow-up after excisional biopsy (NCCN,

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2026a). Borderline and malignant phyllodes tumors receive follow-up imaging due to the possibility of recurrence and/or metastasis (NCCN, 2026d).

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Procedure Codes Associated with Breast Imaging

Guideline

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Procedure Codes Associated with Breast Imaging

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The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Description
C8903	Magnetic resonance imaging with contrast, breast; unilateral
C8905	Magnetic resonance imaging without contrast followed by with contrast, breast; unilateral
C8906	Magnetic resonance imaging with contrast, breast; bilateral
C8908	Magnetic resonance imaging without contrast followed by with contrast, breast; bilateral
S8080	Scintimammography (radioimmunoscintigraphy of the breast), unilateral, including supply of radiopharmaceutical
0633T	Computed tomography, breast, including 3D rendering, when performed, unilateral; without contrast material
0634T	Computed tomography, breast, including 3D rendering, when performed, unilateral; with contrast material(s)
0635T	Computed tomography, breast, including 3D rendering, when performed, unilateral; without contrast, followed by contrast material(s)
0636T	Computed tomography, breast, including 3D rendering, when performed, bilateral; without contrast material(s)
0637T	Computed tomography, breast, including 3D rendering, when performed, bilateral; with contrast material(s)
0638T	Computed tomography, breast, including 3D rendering, when performed, bilateral; without contrast, followed by contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing

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Code	Description
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
73706	Computed tomographic angiography, lower extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
76497	Unlisted computed tomography procedure (eg, diagnostic, interventional)
77021	Magnetic resonance imaging guidance for needle placement (eg, for biopsy, needle aspiration, injection, or placement of localization device) radiological supervision and interpretation
77046	Magnetic resonance imaging, breast, without contrast material; unilateral
77047	Magnetic resonance imaging, breast, without contrast material; bilateral
77048	Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; unilateral

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Code	Description
77049	Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; bilateral
78800	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging
78801	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days
78811	Positron emission tomography (PET) imaging; limited area (eg, chest, head/neck)

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General Information

Abbreviations used in the Cardiac Imaging Guidelines

Abbreviation	Description
ACC	American College of Cardiology
ACS	Acute coronary syndrome
AHA	American Heart Association
AMI	Acute myocardial infarction
ANOCA	Angina with no obstructive coronary artery disease
ASCOT	Anglo-Scandinavian Cardiac Outcomes Trial
ASD	Atrial septal defect
AVR	Aortic valve replacement
BMI	Body mass index
BiVAD	Biventricular assist device
CABG	Coronary artery bypass grafting
CAC	Coronary artery calcium
CAD	Coronary artery disease
CAD-RADS 2	The Coronary Artery Disease Reporting and Data System
CHF	Congestive heart failure
CIED	Cardiac implantable electronic device

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Abbreviation	Description
CMD	Coronary microvascular dysfunction
CMR	Cardiovascular magnetic resonance
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
CCTA	Coronary computed tomography angiography
CCT	Cardiac computed tomography
CTA	Computed tomography angiography
CTEPH	Chronic thromboembolic pulmonary hypertension
CTRCD	Cardiotoxic Agent/Cancer Therapeutics-Related Cardiac Dysfunction
CTV	Computed tomography venography
CV	Cardiovascular
EBCT	Electron beam computed tomography
ECP	External counterpulsation (also known as EECP)
ECG	Electrocardiogram
ECP	External counterpulsation
ETT	Exercise treadmill stress test
FDG	Fluorodeoxyglucose, a radiopharmaceutical used to measure myocardial metabolism
FFR	Fractional flow reserve
HCM	Hypertrophic cardiomyopathy
HF	Heart failure
INOCA	Ischemia with no obstructive coronary artery disease

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Abbreviation	Description
IV	Intravenous
LAD	Left anterior descending coronary artery
LCx	Left circumflex artery
LDL-C	Low density lipoprotein cholesterol
LHC	Left heart catheterization
LM	Left main coronary artery
LV	Left ventricle
LVAD	Left ventricular assist device
LVEF	Left ventricular ejection fraction
LVOT	Left ventricular outflow tract
MI	Myocardial infarction
MINOCA	Myocardial infarction with no obstructive coronary artery disease
MPI	Myocardial perfusion imaging (SPECT study, nuclear cardiac study)
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
mSv	millisievert (a unit of radiation exposure) equal to an effective dose of a joule of energy per kilogram of recipient mass
MUGA	Multi gated acquisition scan of the cardiac blood pool
PCI	Percutaneous coronary intervention (includes percutaneous coronary angioplasty (PTCA) and coronary artery stenting)
PET	Positron emission tomography
PET MPI	PET myocardial perfusion imaging

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Abbreviation	Description
PTCA	Percutaneous coronary angioplasty
RCA	Right coronary artery
RHC	Right heart catheterization
RVAD	Right ventricular assist device
SCAD	Spontaneous coronary artery dissection
SPECT	Single photon emission computed tomography
SPECT MPI	SPECT myocardial perfusion imaging
Stress-perfusion CMR	Stress-perfusion cardiovascular magnetic resonance (CMR)
Stress Echo	Stress echocardiography
TEE	Transesophageal echocardiogram
TAVI	Transcatheter aortic valve implantation
TAVR	Transcatheter aortic valve replacement
TIA	Transient Ischemic Attack
TTE	Transthoracic echocardiogram
VSD	Ventricular septal defect

Glossary

Acute Chest pain	Chest pain is new onset (<2 mo) or involves a change in pattern, intensity, or duration compared with previous episodes in an individual with recurrent symptoms

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Acute Coronary Syndrome (ACS)	ACS (unstable angina, STEMI and NSTEMI) - sudden imbalance between myocardial oxygen consumption and demand, usually related to coronary artery obstruction, but includes other non-coronary artery origins such as acute coronary insufficiency (e.g., coronary embolism), hypotension, non-ischemic myocardial injury (e.g., myocarditis) and multifactorial causes that are not mutually exclusive (e.g., stress cardiomyopathy)
Adverse Pregnancy Outcomes (APO)	Adverse pregnancy outcomes (APOs) include myriad maternal or fetal complications, including hypertensive disorders of pregnancy (gestational hypertension, preeclampsia, eclampsia, and HELLP [hemolysis, elevated liver enzymes, low platelets] syndrome), placental abruption, spontaneous preterm birth, fetal growth restriction, and small-for-gestational-age infant
Agatston Score	A nationally recognized calcium score for the coronary arteries based on Hounsfield units and size (area) of the coronary calcium
Angina pectoris	Retrosternal chest discomfort that builds gradually in intensity (over several minutes), is usually precipitated by stress (physical or emotional) or occurring at rest (as in the case of an ACS) with characteristic radiation (e.g., left arm, neck, jaw) and its associated symptoms (e.g., dyspnea, nausea, lightheadedness). When actively treated (e.g., nitroglycerin) or spontaneously resolving (e.g., with rest), it dissipates over a few minutes
Anginal variants or equivalents	Symptoms or pain at a site other than the chest occurring in an individual at high cardiac risk (i.e., known CAD, diabetes). Anginal equivalents have the same importance as angina pectoris and can present as dyspnea, diaphoresis, nausea, extreme fatigue, pain, pressure, tightness, or discomfort in shoulders, arms, neck, back, upper abdomen, or jaw not otherwise explained by another process.
ARVD/ARVC – Arrhythmogenic Right	A potentially lethal inherited disease with syncope and rhythm disturbances, including sudden death, as presenting manifestations

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Ventricular Dysplasia/ Cardiomyopathy	
BNP	B-type natriuretic peptide, blood test used to diagnose and track heart failure (n-T-pro-BNP is a variant of this test)
Brugada Syndrome	An electrocardiographic pattern that is unique and might be a marker for significant life-threatening dysrhythmias
Chronic Coronary Syndrome	CAD that is chronic, often progressive, and is treatable with lifestyle adjustments, medications, and invasive interventions instituted to achieve disease stabilization or regression
Double Product (Rate Pressure Product)	An index of cardiac oxygen consumption, is the systolic blood pressure times heart rate, generally calculated at peak exercise; over 25000 means an adequate stress load was performed
Fabry Disease	An infiltrative cardiomyopathy, can cause heart failure and arrhythmias
Fatigue	A subjective feeling of weakness, tiredness or exhaustion. Exertional fatigue is acute in nature, with rapid onset, short duration, and short recovery period.
First-degree relative	A biological parent, sibling, or child of an individual
Hibernating myocardium	Viable but poorly functioning or non-functioning myocardium which likely could benefit from intervention to improve myocardial blood supply
Major epicardial coronary arteries	The large, angiographically visible coronary arteries supplying the myocardium, including the left main, LAD, LCx, RCA, and clinically significant branch vessels >1.5 mm in diameter
NSTEMI (Non-ST Segment Myocardial Infarction)	Troponin rise/fall with ≥1 value >99th percentile without STEMI ECG criteria,

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Optimized Medical Therapy	Should include (where tolerated) antiplatelet agents, calcium channel antagonists, partial fatty acid oxidase inhibitors (e.g., ranolazine), statins, short-acting nitrates as needed, long-acting nitrates up to 6 months after an acute coronary syndrome episode, beta blocker drugs (optional), angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blocking (ARB) agents (optional)
Platypnea	Shortness of breath when upright or seated (the opposite of orthopnea) and can indicate cardiac malformations, shunt or tumor
Risk factors for Cardiac Chest pain	Comorbidities that increase the risk of developing coronary artery disease such as age ≥65 y, diabetes, hypertension (i.e., stage 1 hypertension (130–139mm Hg systolic or 80–89mm Hg diastolic), or stage 2 hypertension (≥140mm Hg systolic or ≥90mm Hg diastolic), adverse pregnancy outcomes, family history of premature CAD (history of any direct blood relatives [parents, siblings, children]) who have had any of the following conditions at age 55 or younger for male relatives or age 65 or younger for female relatives: AMI, sudden cardiac death without obvious cause, CABG surgery, PCI, familial/genetic factors (includes genetic abnormalities leading to vasculopathies, aneurysmal disorders, cardiomyopathies, coagulopathies, and inherited dysrhythmia syndromes)
Silent ischemia	Absence of ischemic symptoms or signs prior to objective demonstration of ischemia by stress testing and/or demonstration of obstructive CAD
Stable Chest Pain	Chest pain symptoms are chronic (≥2 mo) and associated with consistent precipitants such as exertion or emotional stress
STEMI (ST Segment Myocardial Infarction)	STEMI (ST Segment Myocardial Infarction): ECG: persistent ST-elevation meeting J-point criteria + troponin rise/fall above 99th percentile
Syncope	Loss of consciousness; near-syncope is not syncope

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Takotsubo cardiomyopathy	Apical dyskinesis oftentimes associated with extreme stress and usually thought to be reversible
Troponin	A marker for ischemic injury, primarily cardiac
TAVR (TAVI)	A minimally invasive procedure to treat aortic valve disease
Unstable Angina	Ischemic symptoms at rest or with decreasing threshold, present <2 weeks, without STEMI ECG criteria and without troponin elevation.

Practice Estimate of Effective Radiation Dose Chart for Selected Imaging Studies

Imaging Study	Estimate of Effective Radiation Dose
PET myocardial perfusion study: Rubidium-82 Nitrogen-13 ammonia	4mSv 2mSv
Thallium myocardial perfusion study (MPI) Dual isotope: 3.5 mCi 201Tl rest/ 30 mCi 99mTc sestamibi stress	23mSv
Diagnostic conventional coronary angiogram (catheterization)	2mSv to 22mSv
Coronary computed tomography angiography (CCTA)	8.7mSv
Cardiac CT for calcium scoring	1mSv to 5mSv
CT Abdomen and Pelvis	7.7mSv
Chest x-ray	0.1mSv

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General Criteria

Information Needed to Support Medical Necessity

- A pertinent clinical evaluation since the onset or change in symptoms is required prior to considering advanced imaging, which includes:
  - Relevant clinical history
  - Physical examination and pertinent diagnostic testing results such as recent ECG, chest x-ray or ECHO/ultrasound, cardiovascular lab studies performed after symptoms started or worsened
    - Effort should be made to obtain copies of reported abnormal ECG studies in order to determine whether the ECG is uninterpretable for ischemia on ETT
  - Report from most recent previous stress testing or other diagnostic cardiac imaging if performed
  - A relevant clinical evaluation documenting any subjective findings (complaints, changes in behavior) or objective findings (clinical exam findings)
    - Other meaningful contact (telephone call, electronic mail or messaging) by an established individual can substitute for a face-to-face clinical evaluation such as requests based on new increased or worsening symptoms.
    - Some conditions may require a face-to-face evaluation as discussed in the applicable condition-specific guideline sections (such as requests based on new physical exam findings).
    - A clinical evaluation may be medically unnecessary if the individual is undergoing a guideline-supported, scheduled follow-up imaging or other designated procedural evaluation.
    - Exceptions due to routine surveillance indications are addressed in the applicable condition-specific guideline sections.
  - Vital signs, height and weight, BMI, or description of general habitus
  - Clinical question to be answered by advanced imaging that will affect management of the clinical condition
- Cardiac imaging is not medically necessary if the results will not affect clinical management decisions. If a decision to perform cardiac catheterization or other angiography has already been made, there is often no need for imaging stress testing.
- Assessment of ischemic symptoms (if present) based on the descriptions below following this section

Cardiac evaluation

Cardiac Chest Pain (likely angina)

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For the purpose of this guideline, when diagnostic testing is requested to evaluate cardiac symptoms for suspected ischemic origin, chest pain is defined as follows:

- Cardiac chest pain (stable angina pectoris, typical angina, likely angina) is defined as **one** of the following:
  - Retrosternal chest discomfort described as pain, pressure, squeezing, heaviness, tightness, or burning, and may radiate to the left arm, neck, jaw, or back that is precipitated by exercise or stress and resolved with rest or nitroglycerin
  - In an individual with known CAD (history of myocardial infarction, prior coronary revascularization with PCI or CABG, imaging or testing showing obstructive CAD) or SCAD (spontaneous coronary artery dissection) with any of the following symptoms:
    - chest discomfort
    - unexplained exertional fatigue
    - unexplained dyspnea on exertion
    - an individual's known anginal equivalent (symptoms with prior known cardiac event)
  - Retrosternal chest discomfort described as pain, pressure, squeezing, heaviness, tightness, or burning, and may radiate to the left arm, neck, jaw, or back that is precipitated by exercise or stress is considered cardiac chest pain in the setting of any of the following:
    - age ≥65
    - diabetes mellitus
    - hypertension
    - history of adverse pregnancy outcomes
    - chest pain associated with syncope
    - family history of premature CAD (occurring before age 56 in males or before age 66 in females)
- Possible Cardiac Chest Pain (less likely angina, possible angina. atypical chest pain):
  - Symptoms suggestive of a cardiac origin but lacking definitive features or occurring in a time course not suggestive of angina (such as atypical pain location or quality, pain resolves spontaneously within seconds or lasts for an extended period and is unrelated to exertion)
  - May occur in the presence of mild associated symptoms, or in the presence of some risk factors without diagnostic confirmation
- Non-cardiac explanation:
  - Pain likely due to non-cardiac causes, especially when persistent or recurring despite negative cardiac evaluations
  - Pain qualities include sharp, stabbing, fleeting, or positional. Associated symptoms may include heartburn unrelated to meals or abdominal discomfort.
- Anginal equivalents (individuals with previously documented CAD only):

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- Symptoms consistent with individual's known angina pattern in an individual with a history of CABG or PCI
- Dyspnea on exertion
- Fatigue (overwhelming sense of unexplained exhaustion causing a decreased capacity for physical activity or mental work)

Other signs and symptoms suggestive of potential cardiac etiology:

- dyspnea
- orthopnea
- paroxysmal nocturnal dyspnea
- heartburn unrelated to meals/nausea and vomiting
- palpitations
- syncope
- heart failure

Note: Chest pain remains the predominant symptom reported by females among those diagnosed with an acute coronary syndrome.

For the purpose of this guideline, evidence documenting the presence of obstructive CAD includes any of the following:

- Prior heart catheterization or CCTA revealing any of the following:
  - ≥40% stenosis of the left main coronary artery
  - ≥50% stenosis for other major epicardial vessels
  - Significant stenosis defined by an FFR of ≤0.80
  - History of a prior PCI or CABG

For the purpose of this guideline, evidence documenting the presence of non-obstructive CAD includes prior heart catheterization or CCTA revealing any of the following:

- <40% stenosis of the left main coronary artery
- <50% stenosis for other major epicardial vessels
- FFR >0.8

The Coronary Artery Disease Reporting and Data System (CAD-RADS 2) classification of percentage luminal diameter coronary artery stenosis on coronary CT angiography (CCTA) is as follows:

- CAD-RADS 0: 0%
- CAD-RADS 1: 1% to 24%
- CAD-RADS 2: 25% to 49%
- CAD-RADS 3: 50% to 69%
- CAD-RADS 4:
  - ≥50% left main coronary artery stenosis
  - ≥70% in at least one major epicardial coronary artery

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- CAD-RADS 5: 100% (total occlusion)

For the purposes of this guideline, evidence documenting a prior MI includes any of the following:

- presence of diagnostic Q waves on an ECG
- a fixed perfusion defect on MPI
- akinetic or dyskinetic wall motion on echocardiogram
- area of Late Gadolinium Enhancement (LGE) on cardiac MRI suggesting scar

Findings that may alter the ECG changes during exercise or are uninterpretable for ischemia on a stress test:

- Complete Left Bundle Branch Block (bifasicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia)
- Ventricular paced rhythm
- Pre-excitation pattern such as Wolff-Parkinson-White
- ≥1.0mm ST segment depression (NOT nonspecific ST/T wave changes)
- LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
- T wave inversion in at least two contiguous inferior and/or lateral leads. This includes leads I, II, AVF, AVL, V5 or V6. (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included).
- Individual on digitalis preparation

The Exercise Treadmill Test (ETT)

- Requirements for a diagnostic ETT include:
  - ECG that can be interpreted for ischemia
  - Individual capable of exercise to achieve target heart rate on a treadmill or similar device (5 METs or greater; see functional capacity below). Target heart rate is calculated as 85% of the maximum age predicted heart rate (MPHR). MPHR is estimated as 220 minus the individual's age.
- An abnormal ETT (exercise treadmill test) includes at least one of the following:
  - ST segment depression (horizontal or downsloping ≥1.0 mm below baseline)
  - Development of chest pain
  - Drop in systolic blood pressure >10 mmHg during exercise
  - Non-sustained ventricular tachycardia ≥3 consecutive ventricular beats at a rate of >100 beats per minute
  - Sustained ventricular tachycardia (ventricular rhythm at rate >100 beats/minute lasting >30 seconds or requiring termination due to hemodynamic compromise in <30 seconds)
- Functional capacity ≥5 METs equates to the following:
  - Can walk four blocks without stopping

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- Can walk up a hill
- Can climb one flight of stairs without stopping
- Can perform heavy work around the house
- Can walk 4 mph at a brisk pace

Evidence Discussion

Chest pain

Many factors are taken into consideration when an individual presents chest pain or symptoms suspect for an underlying cardiac etiology, such as coronary artery disease or heart failure. Details such as precipitating and alleviating factors, duration of the symptoms, chronicity, progression, and prior medical history or risk factors that may escalate the concern for ischemia. Symptoms associated with cardiac etiology can include chest pain, pressure, heaviness, tightness, dyspnea, diaphoresis, nausea/vomiting, lightheadedness, syncope, and palpitations. Cardiac pain related to ischemia is characterized by pressure, squeezing, heaviness, tightness, or burning in the chest, often retrosternal, and radiating to the left arm, neck, jaw, or back. In general, ischemic chest pain has a gradual onset over minutes, is relieved by rest or nitroglycerin, and is precipitated by exertion or emotional stress (Gulati et al., 2021). Risk factors increasing the likelihood of an ischemic etiology of chest pain include age ≥65, diabetes, hypertension, history of adverse pregnancy outcomes, chest pain associated with syncope, family history of premature CAD, and genetic predispositions (Dehmer et al., 2020) (Bays et al., 2021).

CAD RADS 2

Coronary Artery Disease – Reporting and Data System (CAD-RADS 2) is a standardized reporting framework for coronary CT angiography (CCTA) results designed to improve communication and guide clinical management. Classification includes stenosis severity (0–5), plaque burden (P1–P4), and modifiers (e.g., HRP, I, S, G, E) for CT-FFR and myocardial CT perfusion for ischemia assessment and is applicable to both stable and acute chest pain evaluations (Cury et al., 2022).

Background and Supporting Information

An observational study found that, compared with the Duke Activity Status Index, subjective assessment by clinicians generally underestimated exercise capacity

Upsloping ST segment depression is not considered to be an abnormal ETT finding because of its low specificity.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social

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conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Stress Testing

Guideline

Stress Testing with Imaging (CD-1.4)
Stress Testing with Imaging-Preoperative (CD-1.5)
Stress Testing for Microvascular Dysfunction (CD-1.10)
Stress Testing with Imaging-Coding
References
Quantitative Myocardial Blood Flow Assessment by PET MPI or Stress-perfusion CMR (CD-1.11)
References

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Stress Testing with Imaging (CD-1.4)

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Criteria

Medically Necessary

Imaging stress test (PET MPI, SPECT MPI, Stress Echo, **or** Stress-perfusion CMR) is considered medically necessary in **any** of the following clinical settings:

Cardiac Chest Pain

New, recurrent or worsening cardiac chest pain as defined in **General Guidelines (CD-1.0)**

Symptomatic with known CAD

Prior history of PCI (percutaneous coronary intervention) or CABG (coronary artery bypass graft surgery) or a history of obstructive CAD as defined in **General Guidelines (CD-1.0) and any** of the following:

- Cardiac chest pain as defined in **General Guidelines (CD-1.0)**
- Anginal equivalents such as atypical chest pain, exertional dyspnea or exertional fatigue
- Symptoms similar to prior ischemic episode

Newly elevated troponin with known CAD

Prior history of PCI (percutaneous coronary intervention) or CABG (coronary artery bypass graft surgery) or a history of obstructive CAD as defined in **General Guidelines (CD-1.0) and** a new Troponin elevation after last evaluation with stress test, CCTA, or diagnostic cardiac catheterization

Symptomatic and does not meet the requirements for an ETT without imaging

New, recurrent, or worsening symptoms of chest pain, or new, recurrent, or worsening symptoms of exertional dyspnea or exertional fatigue that is not explained by another process, **and** the individual does not meet the medically necessary components needed for an ETT due to a history of **any** of the following:

- Findings that may alter the ECG changes during exercise or are uninterpretable for ischemia on a stress test:

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- Complete Left Bundle Branch Block (bifasicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia)
- Ventricular paced rhythm
- Pre-excitation pattern such as Wolff-Parkinson-White
- ≥1.0mm ST segment depression (NOT nonspecific ST/T wave changes)
- LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
- T wave inversion in at least two contiguous inferior and/or lateral leads. This includes leads I, II, AVF, AVL, V5 or V6. (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included).
- Individual on digitalis preparation

- Inability to perform the exercise needed to achieve target heart rate (85% of the maximum age predicted heart rate or 220 minus the individual's age) on a treadmill or similar device (5 METs or greater) due to any of the following limitations:
  - Unable to safely perform ETT due to gait disturbances, use of assistive devices, or other documented neuromuscular abnormalities
  - Use of home oxygen for daily activity
  - Documented activity-limiting dyspnea or heart failure
  - Provider assessment that performing an ETT would be unsafe
  - Unstable angina with concern for active acute coronary syndrome, or recent elevated troponin
  - Severe aortic stenosis or other significant aortic valve disease
  - Severe hypertension that can not be controlled prior to stress testing

Symptomatic with inconclusive or abnormal ETT or elevated CAC

New, recurrent or worsening symptoms of chest pain, or new, recurrent, or worsening symptoms of exertional dyspnea or exertional fatigue that is not explained by another process, **and** any of the following:

- Inconclusive ETT (exercise treadmill test) due to any of the following:
  - <85% maximum predicted heart rate achieved
  - Exercise ECG is uninterpretable for ischemia (for example due to development of rate-related left bundle branch block during exercise)
- Abnormal ETT with any of the following results:
  - ST segment depression (horizontal or downsloping ≥1.0 mm below baseline)
  - Development of chest pain
  - Drop in systolic blood pressure >10 mmHg during exercise
  - Non-sustained ventricular tachycardia ≥3 consecutive ventricular beats at a rate of >100 beats per minute

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  - Sustained ventricular tachycardia (ventricular rhythm at rate >100 beats/minute lasting >30 seconds or requiring termination due to hemodynamic compromise in <30 seconds)
- Coronary artery calcium (CAC) score ≥100

Symptomatic with risk factors

Stress test with imaging is medically necessary in individuals with **both** of the following conditions:

- New, recurrent or worsening symptoms of chest pain, or new, recurrent, or worsening symptoms of exertional dyspnea or exertional fatigue that is not explained by another process
- individuals 50 years of age or above with 2 or more of the following CV risk factors:
  - diabetes
  - tobacco smoker
  - family history of premature CAD in a first-degree relative (biologic parent, sibling, or child)
  - hypertension
  - hyperlipidemia
  - history of adverse pregnancy outcomes (APOs)

Heart failure or left ventricular systolic dysfunction

Stress test with imaging is medically necessary to evaluate heart failure or left ventricular systolic dysfunction when there is documentation of **any** of the following:

- New or worsening heart failure
- New left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
- Worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
- Significant ischemic ventricular dysfunction (suspected hibernating myocardium) to assess myocardial viability when there are persistent symptoms or heart failure and revascularization is being considered

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Note:

MRI, cardiac PET, SPECT MPI, or Dobutamine stress echo can be used to assess myocardial viability depending on physician preference. See also **Cardiac PET – Metabolic – Indications (CD-6.4)**

Syncope or arrhythmia

Stress test with imaging is medically necessary for **any** of the following:

- Syncope of suspected ischemic etiology not otherwise explained

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- Sustained ventricular tachycardia (ventricular rhythm at rate >100 beats/minute lasting >30 seconds or requiring termination due to hemodynamic compromise in <30 seconds).
- Non-sustained ventricular tachycardia ≥3 consecutive ventricular beats at rate >100 beats/minute
- Frequent PVCs (premature ventricular complexes) >30 PVCs per hour
- Prior to starting a Class IC antiarrhythmic agent (flecainide or propafenone) to assess for CAD and annually while taking the medication

With or without symptoms for moderate coronary artery stenosis

Stress test with imaging is medically necessary to evaluate the functional significance of moderate stenosis when there is documentation of **either** of the following:

- CCTA (coronary computed tomography angiography) with moderate stenosis (50 to 69%-CAD-RADS 3 as defined in **General Guidelines CD-1.0**)
- Invasive coronary angiography with intermediate severity stenosis and invasive physiological testing has not been done

Without symptoms

Stress test with imaging is medically necessary for any of the following:

- Prior to starting Interleukin-2
- An uninterpretable ECG as described in **General Guidelines (CD 1.0)** that has not been previously evaluated
- Every 2 years if there is a history of silent ischemia (absence of ischemic symptoms or signs prior to objective demonstration of ischemia by stress testing and/or demonstration of obstructive CAD as defined in **General Guidelines (CD-1.0)**
- Prior to starting a Class IC antiarrhythmic agent (flecainide or propafenone) to assess for CAD and annually while taking the medication
- Asymptomatic individual who has an ischemic EKG response on ETT (horizontal or downsloping ST depression ≥1.0mm below baseline)

Evidence Discussion

Peer-reviewed literature supports defining likely cardiac chest pain using classic ischemic symptom features typically precipitated by exertion or emotional stress and relieved by rest or nitroglycerin (Gulati et al., 2021; Virani et al., 2023). Available evidence also recognized symptoms that are less likely cardiac chest pain but may reflect a nonischemic cardiac etiology such as dyspnea, and syncope, and still warrant cardiac consideration (Gulati et al., 2021; Amsterdam et al., 2014). Non-cardiac chest pain was distinguished by pleuritic, positional, reproducible, localized, or non-exertional features and by the presence of an alternative non-cardiac explanation (Gulati et al., 2021; Erhardt et al., 2002).

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Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of myocardial perfusion imaging (MPI) with single photon emission computed tomography (SPECT) for individuals with signs or symptoms consistent with coronary artery disease (CAD) such as typical angina. In addition, they support the use of SPECT perfusion imaging in symptomatic individuals with known CAD and those with prior interventions such as coronary artery bypass surgery, coronary stenting, and preoperative risk stratification. These guidelines balance the appropriate testing of individuals with SPECT versus unnecessary and potentially harmful testing and downstream procedures.

Also, as supported by society guidelines, use of SPECT is medically necessary in detection of cardiac transthyretin amyloidosis (ATTR) after light chain amyloidosis (AL) is ruled out by appropriate blood and urine testing. Positron emission tomography (PET) is an advanced imaging approach in that it allows for more accurate attenuation correction than SPECT, which can be helpful in individuals with higher BMIs or other sources of attenuation. In addition, due to accurate attenuation correction and the unique attributes of PET radionuclides, PET allows the quantitation of myocardial blood flow and flow reserve which has been shown to be helpful in the diagnosis and prognosis of obstructive and no obstructive CAD.

Background and Supporting Information

- Imaging Stress Tests include any one of the following:
  - Stress Echo
  - SPECT MPI
  - Stress-perfusion MRI may include AQMBF
  - PET MPI may include AQMBF
- Stress testing with imaging can be performed with maximal exercise or chemical stress (adenosine, dipyridamole, dobutamine, or regadenoson)

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Stress Testing with Imaging-Preoperative (CD-1.5)

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Table-2 Cardiac Risk Stratification List

High-risk (> 5%)	Intermediate-risk (1-5%)	Low-risk (<1%)
• Open aortic and other major open vascular surgery • Open peripheral vascular surgery • Esophagectomy • Pneumonectomy • Open intraperitoneal and/or intrathoracic surgery with organ resection	• Open intraperitoneal and/or intrathoracic surgery without major organ resection • Open carotid endarterectomy • Head and neck surgery • Open orthopedic surgery • Open prostate surgery	• Endoscopic procedures • Superficial procedures • Cataract surgery • Breast surgery • Ambulatory surgery • Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention

Criteria

Imaging stress test meets criteria for an indication independent of planned surgery

An imaging stress test is considered medically necessary prior to planned surgery when criteria is met independent of planned surgery based on **Stress Testing with Imaging – Criteria (CD-1.4)** or **Hypertrophic Cardiomyopathy (HCM) (CD-14)** or **Cardiac Imaging in Transplants (CD-16)** or other condition specific criteria in this guideline

Pre-surgical imaging stress test based on surgical-risk (see Table-2)

Surgery risk-level:

- **High-risk Surgery:** An imaging stress test is considered medically necessary when any of these conditions apply:
  - it has been one year or more since the last imaging stress test
  - new cardiac symptoms have developed since the last imaging stress test
  - new EKG changes have developed since the last imaging stress test

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- **Intermediate-risk Surgery:** An imaging stress test is considered medically necessary when **all** of the following apply:
  - individual is unable to perform an ETT
  - it has been one year or more since the last imaging stress test **or** new cardiac symptoms have developed since the last imaging stress test **or** new EKG changes have developed since the last imaging stress test
  - clinical history documents **one** of the following clinical risk factors for cardiac death and non-fatal MI at time of non-cardiac surgery:
    - ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
    - compensated heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral fine crackles, chest x-ray showing heart failure)
    - previous TIA or stroke
    - diabetes mellitus
    - creatinine level >2mg/dL
- **Low-risk:** Pre-operative imaging stress testing is considered not medically necessary.

Evidence Discussion

Professional society guidelines support preoperative cardiac testing that considers whether the individual would meet criteria for stress imaging independent of surgery, the cardiac risk of the planned procedure, functional capacity, and clinical risk factors. The ACC/AHA perioperative cardiovascular evaluation guideline emphasizes selective testing and states that noninvasive stress testing should generally be performed only when results are expected to change management (Fleisher et al., 2014). The evidence base for preoperative stress imaging is primarily by professional society guidance, perioperative risk models, and observational evidence. Potential harms include false-positive findings, surgical delays, unnecessary angiography, radiation exposure for nuclear imaging, and pharmacologic stress-related adverse events.

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Stress Testing for Microvascular Dysfunction (CD-1.10)

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Criteria

Medical necessity requires the combined study (PET MPI with AQMBF or Stress-perfusion CMR with AQMBF).

PET MPI with AQMBF or Stress-perfusion CMR with AQMBF is considered medically necessary to evaluate coronary microvascular function in individuals with suspected or known non-obstructive CAD such as MINOCA, INOCA, or ANOCA, when there is persistent chest pain, exertional dyspnea, or exertional fatigue, and either of the following:

- a normal or equivocal ETT
- coronary angiography or CCTA did not identify obstructive coronary artery disease; **and**
  - there are persistent symptoms despite optimized medical therapy (OMT); **or**
  - there is evidence of myocardial ischemia on functional testing (e.g., invasive coronary function testing or noninvasive stress testing without AQMBF)

Evidence Discussion

Angina or ischemia with no obstructive coronary arteries (ANOCA/INOCA) should be considered when ischemic symptoms persist and coronary arteries are either normal or nonobstructive. These clinical presentations may reflect coronary microvascular or endothelial dysfunction, epicardial coronary spasm or microvascular spasm, myocardial bridging, or other occult coronary abnormalities despite the absence of obstructive epicardial CAD. The JACC state-of-the-art review on ANOCA notes that many affected individuals have normal findings on conventional diagnostic testing and that absence of obstructive CAD does not exclude coronary microvascular dysfunction (Samuels et al., 2023).

The 2021 multisociety chest pain guideline recognizes that individuals with ongoing symptoms concerning for ischemia and no obstructive coronary arteries benefit from microvascular function testing with PET MPI or CMR stress with myocardial blood flow measurement. (Gulati et al., 2021).

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Stress Testing with Imaging-Coding

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Stress echo, SPECT MPI or stress MRI

CPT®	Codes Addressed
Stress-perfusion CMR	
75559	Cardiac MRI for morphology and function without contrast, with stress imaging
75563	Cardiac MRI for morphology and function without and with contrast, with stress imaging
+0899T	Noninvasive determination of absolute quantitation of myocardial blood flow (AQMBF), derived by augmentative algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)
+0900T	Noninvasive estimate of absolute quantitation of myocardial blood flow (AQMBF), derived by assistive algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure).
SPECT MPI	
78451	MPI, tomographic (SPECT) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	MPI, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection

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CPT®	Codes Addressed
78453	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78454	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
Stress Echo	
93350	Echocardiography (TTE), (2D), with or without m-mode, during rest and cardiovascular stress, with interpretation and report
93351	Echocardiography (TTE), (2D), m-mode, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation
PET MPI	
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78491	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study at rest or stress (exercise or pharmacologic)
78492	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic)
+78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)

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Quantitative Myocardial Blood Flow Assessment by PET MPI or Stress-perfusion CMR (CD-1.11)

CD.ST.0001.9.A
v1.0.2027

Criteria

Medically Necessary

Quantitative Myocardial Blood Flow Assessment is considered medically necessary as an add-on to the primary study (PET MPI or Stress-perfusion CMR) when criteria have been met for a PET MPI or a Stress-perfusion CMR

Background and Supporting Information

AQMBF is an add-on study reported in conjunction with myocardial perfusion imaging and is not a standalone procedure. Quantitation of myocardial blood flow at rest and with stress and the calculation of myocardial perfusion reserve (the ratio of stress to rest flow) can be used for diagnosis and prognosis of coronary artery disease and cardiac endothelial dysfunction that can be seen in diabetes, cardiac microvascular disease, left ventricular hypertrophy, and heart transplantation vasculopathy, among other conditions.

- AQMBF with PET (CPT® 78434) is an add-on procedure to a cardiac PET MPI (CPT® 78492 or 78431 only)
- AQMBF with Stress MRI (CPT® 0899T or 0900T) is an add-on procedure to a cardiac stress MRI (CPT® 75559 or 75561).

Coding

Code	Description
+0899T	Noninvasive determination of absolute quantitation of myocardial blood flow (AQMBF), derived from augmentative algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)

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Code	Description
+0900T	Noninvasive estimate of absolute quantitation of myocardial blood flow (AQMBF), derived from assistive algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)
+78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)

Evidence Discussion

Myocardial perfusion imaging (MPI) is used for the diagnosis of coronary artery disease (CAD). Results of MPI have a high level of sensitivity and specificity. Positron emission tomography (PET) and MRI are imaging modalities that allow the performance of MPI and also have the ability to measure absolute myocardial blood flow (AQMBF).

Quantitative myocardial blood flow and myocardial perfusion reserve may provide additional clinical information in obstructive coronary artery disease (CAD), coronary microvascular dysfunction, endothelial dysfunction, and cardiac transplant vasculopathy among others. This use is consistent with multimodality appropriate use criteria supporting advanced stress imaging for detection and risk assessment of chronic coronary disease (Winchester et al., 2023).

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Echocardiography (ECHO)

Guideline

Transthoracic Echocardiography (TTE) Initial Evaluation (CD-2.2)
Frequency of Echocardiography Testing (CD-2.3)
Transthoracic Echocardiography (TTE) General Information (CD-2.1.1)
Transthoracic Echocardiogram (TTE)-Coding (CD-2.1)
References (CD-2)
Transesophageal Echocardiography (TEE) (CD-2.5)
Stress Echocardiography (Stress Echo) (CD-2.7)
3D Echocardiography (CD-2.9)
Myocardial Strain Imaging (CD-2.12)
References (CD-2)

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Transthoracic Echocardiography (TTE) Initial Evaluation (CD-2.2)

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Criteria

Transthoracic Echocardiography (TTE) is considered medically necessary for the initial evaluation of **any** of the following:

Symptoms or signs suggesting cardiovascular disease

- chest pain/discomfort
- dyspnea/shortness of breath, or hypoxemia
- palpitations
- pre-syncope/syncope
- headache with transcranial Doppler evidence of a shunt or high-degree of suspicion for embolic process
- dependent lower extremity edema
- abnormal precordial or peripheral pulse
- new or changing heart murmur or click
- suspected hypertensive heart disease (initial evaluation)
- initial evaluation of known/suspected heart failure based on symptoms and/or signs
- suspected endocarditis with any:
  - fever
  - peripheral stigmata of endocarditis
  - new murmur
- history of rheumatic heart disease
- suspected pericardial diseases
- suspected cardiac injury due to blunt chest trauma

Diagnostic tests suggesting cardiovascular disease

- newly diagnosed RBBB or LBBB
- presence of pathological Q waves in 2 or more contiguous leads
- frequent VPCs defined as occurring more frequently than 30 times per hour or occurring in a pattern of bigeminy, trigeminy, or runs of ventricular tachycardia
- non sustained or sustained ventricular tachycardia (VT)
- ventricular fibrillation (VF)
- newly diagnosed atrial fibrillation/flutter

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- cardiomegaly on a Chest x-ray or other imaging
- elevated level of cardiac biomarkers (Creatinine Kinase isoforms, Troponin I or T, Brain Natriuretic Peptide (BNP), N-Terminal pro b-type natriuretic peptide (NT-proBNP) above the normal reference range as defined by the local laboratory assays)
- initial evaluation of known/suspected heart failure based on diagnostic tests
- suspected inherited or acquired cardiomyopathy (e.g., restrictive, infiltrative, dilated, hypertrophic)
- suspected pulmonary hypertension. See **Pulmonary Hypertension CD-8.1.**
  - ECG changes of right ventricular hypertrophy
  - right ventricular hypertrophy or pulmonary artery dilation on other imaging
  - pulmonary embolism with persistent or new symptoms
- dilated aortic root and/or ascending aorta seen on other imaging
- suspected endocarditis with positive blood cultures indicating bacteremia
- suspected pericardial diseases
- cardiac mass suspected on other imaging
- to rule out intra-cardiac thrombus in individuals with left ventricular systolic dysfunction prior to undergoing catheter ablation of ventricular arrhythmia.
- ≥6 weeks post-myocardial infarction

Extra-cardiac conditions and therapies associated with cardiovascular disease or risk

- CONDITIONS
  - Initial cardiac evaluation of a known systemic, congenital, or acquired disease that could be associated with structural heart disease
  - At risk for developing iron-overload cardiomyopathy (hereditary hemochromatosis or hereditary or acquired hematologic conditions requiring multiple transfusions)
  - Known or suspected connective tissue disease or a genetic condition that predisposes to an aortic aneurysm or dissection (may repeat every 2 years if negative). See **Screening for Vascular related genetic connective tissue Disorders PVD-2.2**.
  - At risk for pulmonary hypertension. See **Pulmonary Hypertension CD-8.1.**
    - scleroderma
    - lupus
    - mixed connective tissue disease
    - Hereditary Hemorrhagic Telangiectasia
    - individuals with pulmonary hypertension mutations (e.g., BMPR2)
  - Suspected pulmonary hypertension in the presence of:

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        - liver disease
        - lung disease
        - HIV
    - Newly diagnosed or strongly suspected cerebral ischemia or peripheral embolic event
- THERAPIES
    - Use of anorectic drugs, ergot derivatives, or other agents associated with valvular heart disease
    - Pre-procedure evaluation for TIPS (transjugular intrahepatic portosystemic shunt). See **Hepatic Arteries and Veins AB-43.1.**
    - Prior to solid organ transplant or hematopoietic stem cell transplant
    - Prior to exposure to cardiotoxic medications or radiation therapy. See **Cardiotoxic agent/Cancer Therapeutics-related Cardiac Dysfunction CD-12.1.**

Inherited cardiovascular conditions

- Individual has first-degree relative diagnosed with thoracic aortic aneurysm or dissection (may repeat every 2 years if negative). See **Screening for Vascular related genetic connective tissue Disorders PVD-2.2**, **Thoracic Aortic Aneurysm PVD-6.2.**
- One-time screening TTE when individual has first-degree relative diagnosed with bicuspid aortic valve. See also **Screening for TAA with Bicuspid Aortic Valves (PVD-2.3).**
- Individual has diagnosed first-degree relative or member is genotype positive for an inherited cardiomyopathy including any of the following:
    - hypertrophic cardiomyopathy
    - non compaction cardiomyopathy
    - familial Dilated Cardiomyopathy
    - arrhythmogenic Cardiomyopathy (e.g., ARVC)

Agitated Saline/Contrast

- One repeat echocardiogram is considered medically necessary if requested for agitated saline (bubble study) or contrast study (for evaluation of shunts or for left ventricular cavity opacification) when agitated saline or contrast were not administered at the time of the initial study and the results of the initial study indicate the need for agitated saline or contrast.

Evaluation of congenital heart disease: see **Adult Congenital Heart Disease CD-11** and **Congenital Heart Disease PEDCD-2** in the Pediatric Cardiology imaging guidelines.

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Frequency of Echocardiography Testing (CD-2.3)

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Repeat Testing by Interval

Criteria

Repeat Transthoracic Echocardiography (TTE) is medically necessary for **any** of the following:

Every 3 years

Valvular heart disease (See also below criteria for Valve surgery or intervention)

- bicuspid aortic valve
- mild aortic stenosis or aortic valve sclerosis without stenosis
- mild aortic or mitral regurgitation
- any mitral stenosis that is not severe, mitral valve area >1.5cm^2
- rheumatic valve changes with commissural fusion
- valve surgery including **any** of the following:
  - surgical valve repair
  - mechanical valve replacement
  - bioprosthetic valve replacement when <10 years since implant

Cardiomyopathy

- First-degree relative with a diagnosis of inherited cardiomyopathy including:
  - Hypertrophic Cardiomyopathy
  - Familial Dilated Cardiomyopathy
  - Idiopathic Dilated Cardiomyopathy
- Individuals genotype-positive for:
  - Familial Dilated Cardiomyopathy

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- Arrhythmogenic Cardiomyopathy (e.g., ARVC)

Every 2 years

Vascular disease

- First-degree relative with known thoracic aortic aneurysm or dissection a repeat echocardiogram is allowed every 2 years when both:
  - Prior aortic imaging (echo, CT, MR) is negative.
  - Last aortic imaging was ≥2 years. See **Screening for Vascular related genetic connective tissue Disorders (PVD-2.2).**

Every year

Valvular heart disease (VHD)

(See also below criteria for valve surgery or intervention)

- moderate or severe regurgitation
- moderate or severe stenosis
- significant valve deformity (regardless of extent of regurgitation or stenosis) when there is documentation of either:
  - thickened myxomatous valve
  - bileaflet prolapse
- surgical bioprosthetic valve replacement when ≥10 years since implant
- post-transcatheter valve repair or replacement

Cardiomyopathy/heart failure

- history of left ventricular systolic dysfunction to evaluate the effectiveness of ongoing therapy
- hypertrophic cardiomyopathy see **Hypertrophic Cardiomyopathy CD-14**
- frequent right ventricular pacing >40%
- chronic LBBB
- frequent PVCs defined as >10,000 PVCs within 24 hours or >10% PVC burden over 24 hours
- left ventricular non-compaction cardiomyopathy
- at risk for developing iron-overload cardiomyopathy (hereditary hemochromatosis or hereditary or acquired hematologic conditions requiring multiple transfusions)
- inherited neuromuscular, metabolic, hematologic or cutaneous syndromes that are known to be associated with the development of cardiomyopathy
- infiltrative cardiomyopathy

Pericardial disease

- Chronic pericardial effusions when findings would potentially alter therapy

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Vascular disease

- Aortic root dilatation that has not yet been repaired. See **Thoracic aortic aneurysm PVD 6.2** and
- For post-repair, see **Post-Aortic Endovascular/Open Surgery Surveillance Studies PVD-6.8**.

At risk for pulmonary hypertension

See **Pulmonary Hypertension CD-8.1**.

- Systemic Sclerosis or Scleroderma
- individuals with pulmonary hypertension mutations (e.g., BMPR2)
- first-degree relatives of individuals with pulmonary hypertension
- connective tissue disorder with symptoms consistent with pulmonary hypertension
- individuals with TR velocity ≥2.8m/s, with no other findings on additional testing
- individuals being treated with medications associated with pulmonary hypertension
- individuals who have a concern documented for pulmonary hypertension and had a negative echocardiogram but still show signs or symptoms of pulmonary hypertension

Every 6 months or twice a year

Valvular heart disease

- Asymptomatic, severe mitral regurgitation if valve surgery is being considered

Pulmonary Hypertension

- See below criteria for Pulmonary Hypertension (See **Pulmonary Hypertension CD-8.1**).
- Surveillance of stable individuals with moderate or severe pulmonary hypertension (pulmonary artery systolic pressure ≥50mmHg)

Anytime

Repeat transthoracic echocardiogram is considered medically necessary **anytime** (without regard for the number or timing of previous echo studies) if there is a change in clinical status, or new signs and symptoms with documentation of **any** of the following:

- cardiac murmurs
- myocardial infarction or acute coronary syndrome
- heart failure (new or worsening):
  - new symptoms of dyspnea

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  - orthopnea
  - paroxysmal nocturnal dyspnea
  - elevated BNP
- known pericardial disease with clinical concern for cardiac tamponade or pericardial constriction
- infective endocarditis for any of the following:
  - repeat imaging within 5-7 days for initially negative or inconclusive imaging when clinical suspicion of endocarditis remains high
  - new or worsening symptoms or signs of endocarditis
  - as needed to guide changes in antibiotic therapy
  - at completion of antibiotic therapy
- stroke/transient ischemic attack
- decompression illness
- prosthetic valve dysfunction or thrombosis
- cardiac transplant
- individuals with Left Ventricular Assist Device (LVAD)
- See also section on **Repeat testing per condition** below and **Left ventricular assist devices (LVAD) (CD-9.4)**.

Repeat Testing Per Condition

Criteria

Repeat Transthoracic Echocardiography (TTE) is medically necessary for **any** of the following:

Valve surgery or intervention

Repeat Transthoracic Echocardiography (TTE) is medically necessary for any of the following:

Surgical valve repair or mechanical valve replacement
- 6 weeks post-surgery to establish baseline
- surveillance every 3 years after surgery

Surgical bioprosthetic valve replacement
- 6 weeks post-surgery to establish baseline
- surveillance every 3 years after surgery until 10 years
- then annually

TAVR follow-up
- 1 week after procedure to establish baseline

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- 1 month post-procedure
- 1 year post-procedure
- then annually

Mitral Valve Repair (mitral valve clip) follow-up

- 1 month post-procedure
- 6 months post-procedure
- 1 year post-procedure
- then annually

Transcatheter Tricuspid Valve Replacement follow-up

- TTE (CPT® 93306) is considered medically necessary post-procedure at the following intervals:
  - 1 month
  - 6 months
  - 1 year
  - then annually

See also **Transcatheter Aortic Valve Replacement (TAVR) (CD-4.8).**

See also **Percutaneous Mitral Valve Repair (mitral valve clip) (CD-13.5)**.

PFO closure, TIPS, Cardiac device therapy, LVAD

Repeat Transthoracic Echocardiography (TTE) is medically necessary for any of the following:

- **PFO Closure**
  - pre-operative evaluation for closure of PFO
  - post-procedural evaluation of PFO repair
  - 6 month follow-up after PFO repair
  - annually if there is a residual shunt on post-operative imaging

  For ASD closure, see **ASD-Atrial septal defects (CD 11.2.1)**.
- **TIPS (transjugular intrahepatic portosystemic shunt).** See **Hepatic Arteries and Veins (AB 43.1)**.
  - 1 time post-procedure for routine follow-up
  - **any time** post-procedure (either):
    - for new signs or symptoms
    - for concern for new or worsening pulmonary hypertension or heart failure
- **Cardiac device therapy**
  - Re-evaluation of LVEF is medically necessary 40 days after MI, 3 months after revascularization, or 3 months after maximally tolerated optimal medical therapy to determine either:

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        - candidacy for device therapy
        - optimal choice of device
    - 1 time follow up within 12 months of implantation of a CRT-D device
- **Ventricular assist device.** See **Ventricular Assist Devices (CD-9.4)**.
    - Prior to implant
    - Routine Post-implant at the following intervals:
        - 2 weeks
        - 1 month
        - 3 months
        - 6 months
        - 12 months
        - every 6 months thereafter

Pulmonary hypertension

Follow-up echocardiogram (TTE) on individuals with PH is considered medically necessary for any of the following:

- every 6 months for surveillance of stable individuals with moderate or severe pulmonary hypertension (pulmonary artery systolic pressure ≥50mmHg)
- 3 months after any change in PH therapy
- prior to planned intubation (e.g., for elective surgery)
- prior to planned pregnancy
- during pregnancy as often as requested by provider
- anytime, without regard for the number or timing of previous echo studies to evaluate change in clinical signs or symptoms

See also **Pulmonary Hypertension CD-8.1**.

Hypertrophic Cardiomyopathy (HCM)

Repeat Transthoracic Echocardiography (TTE) is medically necessary for individuals with hypertrophic cardiomyopathy for any of the following:

- **Surveillance imaging**
    - Every year
- **Post-Septal Reduction Therapy (SRT)**
    - Within 3 to 6 months after surgical myectomy or alcohol septal ablation
- **Cardiac myosin inhibitors**
    - TTE is considered medically necessary to monitor initiation of cardiac myosin inhibitor therapy (including mavacamten and aficamten) and dose titration as follows:
        - baseline study at the beginning of therapy

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- every 2 to 8 weeks during dose titration to maintenance dose
- every 3 months once maintenance dose is reached while on medication

◦ TTE is considered medically necessary while taking cardiac myosin inhibitors to evaluate symptoms or clinical findings that are new since the previous TTE

◦ TTE is considered medically necessary when there is a change in treatment while taking a cardiac myosin inhibitors as follows:

- after dose adjustment due to symptoms or clinical findings, or missed doses
- 4 week after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)
- 12 weeks after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)

See also **Hypertrophic Cardiomyopathy CD-14**.

Cardiac Transplant

Anytime (without regard for the number or timing of previous ECHO studies) when there is a history of cardiac transplant, per transplant center protocol

Cardiotoxic Agents

For re-evaluation in an individual previously or currently undergoing therapy with cardiotoxic agents or radiation therapy, follow **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1)**.

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Transthoracic Echocardiography (TTE) General Information (CD-2.1.1)

CD.EC.0002.2.A
v1.0.2027

Criteria

- Complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306).
- Doppler codes (CPT® 93320, CPT® 93321, and CPT® 93325) are 'add-on codes' (as denoted by the + sign) and are assigned in addition to code for the primary procedure.
  - 93306 includes the Doppler exams, so CPT® codes 93320-93325 are considered not medically necessary as an add-on to CPT® 93306.
- Doppler echo may be used for evaluation of the following:
  - shortness of breath
  - known or suspected valvular disease
  - known or suspected hypertrophic obstructive cardiomyopathy
  - shunt detection
- For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307.
- Limited transthoracic echocardiogram (CPT® 93308) should be billed if the report does not "evaluate or document the attempt to evaluate" all of the required structures.
  - A limited transthoracic echocardiogram is reported with CPT® 93308.
  - CPT® 93321 (not CPT® 93308 if Doppler is included in the study. CPT® 93325 can be reported with CPT® 93308 if color flow Doppler is included in the study.
  - A limited congenital transthoracic echocardiogram is reported with CPT® 93304.

Myocardial Contrast Perfusion Echocardiography (CD-2.11)

Criteria

- Further studies are needed to evaluate the accuracy, reliability, and clinical efficacy of myocardial contrast perfusion echocardiography (CPT® 0439T) and it is considered experimental, investigational, or unproven at this time

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Detection of Heart Failure with Preserved Ejection Fraction

Criteria

Artificial intelligence (AI) applications are being used to extract patterns from medical images in an effort to add clinically relevant information to that obtained by physician interpretation of images. AI algorithms have been employed in the software analysis of echocardiograms in an effort to aid detection of heart failure. Further studies are needed to evaluate the accuracy, reliability, and clinical efficacy of these applications.

- CPT® 0932T Noninvasive detection of heart failure derived from augmentative analysis of an echocardiogram is considered experimental, investigational, or unproven at this time

Evidence Discussion

Transthoracic Echocardiogram

- Transthoracic echocardiogram (TTE) is an ultrasonic examination of the heart through the chest wall. Given that sound waves are used (sonography), there is no exposure to ionizing radiation or possible complications related to contrast induced nephropathy.
- It is readily accessible and transportable allowing for the test to be performed at multiple different locations with no need for blood work.
- TTE is widely accepted as initial imaging modality of choice for the general evaluation of cardiac and pericardial structure and function.
- Multiple evidence-based professional society guidelines indicate that TTE can be appropriately used for the evaluation of multiple cardiac issues including but not limited to evaluation of cardiac symptoms, dyspnea, and pulmonary hypertension.
- A complete comprehensive TTE will utilize multiple acoustic windows and incorporate 2D imaging with appropriate data; including measurements with color and spectral Doppler imaging.
- The test is performed and interpreted by qualified individuals in a facility that is accredited in performing echocardiograms.
- TTE is the primary imaging tool for screening of family members with thoracic aortic disease as well as genetic syndromes that are associated with thoracic aortic aneurysms and dissection. It is not medically necessary for screening of asymptomatic individuals in the general public in the absence of family history of cardiac, vascular, or associated connective tissue disorder.
- TTE offers real-time hemodynamic assessment which may be used in the guidance of therapeutic interventions.

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- Repeat echocardiograms may be done for the surveillance of known valvular heart disease, cardiomyopathies, pulmonary hypertension, and cardiotoxic agents. The need for surveillance echocardiograms are dependent on factors such as morphology, severity, family history of cardiomyopathies, timing of surgery, left ventricular function, symptoms, and for follow-up of post cardiac structural interventions. Timing of surveillance echocardiograms are in alignment with recommendations from various national and international medical specialty organization guidelines and Appropriate Use Criteria based on studies which analyzed progression of valvular disease and timing of invasive intervention.
- Decisions regarding routine echocardiographic follow-up should not be based on the degree of regurgitation alone but should take into account associated structural valvular and cardiac abnormalities. For example, a structurally normal mitral valve with moderate mitral regurgitation by color flow Doppler and normal left atrial size, does not generally require routine echocardiographic follow-up. However, a thickened, myxomatous appearing mitral valve with bi-leaflet prolapse and only trivial or mild mitral regurgitation should be followed echocardiographically at routine intervals.

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Transthoracic Echocardiogram (TTE)-Coding (CD-2.1)

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- Providers performing echocardiography on a pediatric individual may not know what procedure codes they will be reporting until the initial study is completed.
- If a congenital issue is found on the initial echocardiogram, a complete echocardiogram is reported with codes CPT® 93303, CPT® 93320, and CPT® 93325 because CPT® 93303 does NOT include Doppler and color flow mapping.
- If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2D, Doppler and color flow mapping.
- Since providers may not know the appropriate code(s) that will be reported at the time of the pre-authorization request, they may request all 4 codes (CPT® 93303, CPT® 93320, CPT® 93325, and CPT® 93306).
- CPT® 76376 and CPT® 76377 are not unique to 3D Echocardiography. These codes also apply to 3D rendering of MRI and CT studies. See **3D Echocardiography – Coding (CD-2.9)**.
- CPT® 93325 may also be used with fetal echocardiography.
- CPT® 93319 3D echocardiography imaging post-processing of TEE or TTE to evaluate congenital cardiac abnormalities. See **3D Echocardiography – Coding (CD-2.9)**.

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CD.EC.0002.2.A
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Transesophageal Echocardiography (TEE) (CD-2.5)

CD.EC.0002.5.A
v1.0.2027

Transesophageal Echocardiography (TEE)- Indications

Criteria

TEE (CPT® 93312, 93320, and 93325) is considered medically necessary when there is documentation of **any** of the following:

- limited transthoracic echo window when further information is needed to guide management (e.g., suspected or confirmed endocarditis, suspected intracardiac mass, etc.)
- assessing valvular dysfunction, especially mitral regurgitation when TTE is inadequate and intervention is being considered to repair/replace valve
- evaluation of cardiac mass, suspected tumor, or thrombus
- pre-procedural assessment of PFO/ASD
- pre-operative evaluation prior to planned LVAD implant
- embolic source or intracardiac shunting when TTE is inconclusive
  - Examples: atrial septal defect, ventricular septal defect, patent foramen ovale, aortic cholesterol plaques, thrombus in cardiac chambers, valve vegetation, tumor
- embolic events when there is an abnormal TTE or a history of atrial fibrillation
  - clarify atria/atrial appendage, aorta, mitral/aortic valve beyond the information that other imaging studies have provided
- cardiac valve dysfunction
  - differentiation of tricuspid from bicuspid aortic valve in setting of aortic enlargement or significant stenosis or significant regurgitation
  - congenital abnormalities
- assessing for left atrial thrombus prior to cardioversion of atrial fibrillation or atrial flutter
- assessing for left atrial thrombus prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure
- for initial imaging of ascending and descending thoracic aortic aneurysms
- For repeat imaging of established thoracic aneurysms, TEE is medically necessary **only** when imaging with CT or MR is contraindicated.

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- TEE is medically necessary for the evaluation of individuals with hypertrophic cardiomyopathy if TTE is inconclusive for **any** of the following:
  - mitral regurgitation secondary to structural abnormalities of the mitral valve
  - subaortic membrane or aortic valve stenosis
- pre-procedure planning for surgical myectomy or alcohol septal ablation
- Left atrial appendage (LAA) Closure device for any of the following:
  - pre-procedural evaluation
  - repeat imaging 45 days post-procedure
    - Another follow-up study is medically necessary before the 1-year surveillance when the imaging study at 45 days shows a peri-device gap ≥5 mm or Device Related Thrombus usually at 3-6 months.
  - 1 year post-procedure

Evidence Discussion

- Transesophageal echocardiogram (TEE) is a semi-invasive ultrasonic examination of the heart through the esophagus. Due to the proximity of the esophagus to the heart and great vessels, it allows for additional and more accurate information than transthoracic echocardiography for several specific diagnoses, catheter-based cardiac interventions, and cardiac surgery.
- TEE is utilized not only for diagnostic purposes but also for dynamic decision-making with cardioversion, surgical intervention, and assessment of surgical repair.
- TEE has become an essential imaging tool for pediatric and adult cardiologists, cardiac surgeons, and anesthesiologists and is used in outpatient and inpatient settings as well as operating rooms.
- The test is performed and interpreted by physicians that have demonstrated both cognitive and technical competence in TEE.
- TEE is readily accessible, has no ionizing radiation exposure, and does not require use of IV contrast.
- There are relative and absolute contraindications which are reviewed prior to insertion of the TEE probe which include and are not limited to esophageal pathology, coagulopathy, and cervical spine injury.

Transesophageal Echocardiography (TEE)-Coding

TEE coding

Transesophageal Echocardiography	CPT®
TEE with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93312

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Transesophageal Echocardiography	CPT®
TEE probe placement only	93313
TEE image acquisition, interpretation, and report only	93314
TEE for congenital anomalies with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93315
TEE for congenital anomalies, probe placement only	93316
TEE for congenital anomalies, image acquisition, interpretation and report only	93317

Doppler Echocardiography

Description	CPT®
Doppler echo, pulsed wave and/or spectral display	+93320
Doppler echo, pulsed wave and/or spectral display, follow-up or limited study	+93321
Doppler echo, color flow velocity mapping	+93325
Doppler echo, if performed, may be reported separately in addition to the primary TEE codes: CPT® 93312, CPT® 93314, CPT® 93315, and CPT® 93317	

C codes

HCPCS	Description	CPT®
C8925	TEE with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93312
C8926	TEE for congenital anomalies with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93315

- The complete transesophageal echocardiogram service, including both (1) probe (transducer) placement and (2) image acquisition/interpretation, is reported with CPT® 93312.
  - Probe placement only is reported with CPT® 93313.
  - The image acquisition/interpretation only is reported with CPT® 93314.
- Physicians assign codes CPT® 93312, CPT® 93313, and/or CPT® 93314 to report professional services if the test is performed in a hospital or other facility where the physician cannot bill globally.

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  - Modifier-26 (professional component) is appended to the appropriate code.
  - CPT® 93313 and CPT® 93314 should never be used together. If both services are provided, CPT® 93312 is reported.
- Hospitals should report TEE procedures using CPT® 93312 (the complete service). CPT® 93313 and CPT® 93314 are not used for hospital billing.

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Stress Echocardiography (Stress Echo) (CD-2.7)

CD.EC.0002.7.A
v1.0.2027

Stress Echocardiogram-Indications Other Than Ruling-out CAD (CD-2.7)

Criteria

CPT® 93350 or 93351

- See: **Stress Testing with Imaging – Indications (CD-1.4)**
- In addition to the evaluation of CAD, stress echo is considered medically necessary to evaluate the following conditions:
  - dyspnea on exertion (specifically to evaluate pulmonary hypertension)
  - right heart dysfunction
  - valvular heart disease when the outcome would affect a therapeutic or interventional decision
  - pulmonary hypertension when the outcome will measure response to therapy and/or prognostic information
  - hypertrophic cardiomyopathy (as defined in **Obstructive Hypertrophic Cardiomyopathy (HCM) (CD-12.3)** for **either** of the following:
    - Exercise stress echo (CPT® 93351 or 93350) is considered medically necessary for the detection and quantification of dynamic left ventricular outflow tract obstruction in symptomatic individuals with HCM who do **not** have a resting or provocable outflow tract gradient ≥50 mm Hg on TTE.
    - Repeat stress echo is considered medically necessary when there is documentation of **any** of the following:
      - in 1 to 2 years if the resting or provocable outflow tract gradient is <30 mm Hg on prior stress echo
      - worsening symptoms
      - There has been a therapeutic change (i.e., change in medication, surgical procedure performed).
- Spectral Doppler (CPT® 93320 or 93321) and color-flow Doppler (CPT® 93325) are considered medically necessary in the evaluation of the above conditions and can be added to the stress echo code.

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Evidence Discussion

The 2024 AHA/ACC/AMSSM/HRS/PACES/SCMR HCM guideline and ASE multimodality imaging recommendations support exercise stress echocardiography for detection and quantification of latent obstruction in symptomatic individuals without resting or provocable gradients ≥50 mm Hg. Repeat stress echocardiography is supported when symptoms worsen, when treatment changes occur, or when prior gradients were low and reassessment may affect management. Evidence is largely derived from physiologic studies, observational data, and expert consensus rather than randomized trials of imaging strategies; however, the relationship between LVOT obstruction, symptoms, and therapeutic decision-making is well established (Ommen et al., 2024; Nagueh et al., 2022).

Stress echocardiography is a ultrasonic examination of the heart through the chest wall during rest and stress. Given the ultrasound modality, there is no exposure to ionizing radiation or concern for contrast induced renal failure.

Stress echocardiography is used to assess for global and regional systolic function and evaluation of valvular function at rest and during stress. This allows for non-invasive diagnosis and management of coronary artery disease, various cardiomyopathies, pulmonary hypertension, and valvular heart disease.

A complete comprehensive stress echocardiogram will incorporate 2D imaging with multiple acquisition windows during rest and stress and may also incorporate color and spectral Doppler imaging. This provides a dynamic evaluation of myocardial and valvular structure and function under physiological (exercise) or pharmacological stress.

Stress Echo – Coding

Associated codes

Stress Echocardiography	CPT®
Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;	93350
Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: including performance of continuous electrocardiographic monitoring, with physician supervision	93351
Doppler Echocardiography	
Doppler echo, pulsed wave and/or spectral display	+93320

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Stress Echocardiography	CPT®
Doppler echo, pulsed wave and/or spectral display, follow-up/limited study	+93321
Doppler echo, color flow velocity mapping	+93325

Associated HCPCS codes

CPT®	Stress Echocardiography	HCPCS
93350	Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;	C8928
93351	Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: including performance of continuous electrocardiographic monitoring, with physician supervision	C8930

CPT® 93350 and CPT® 93351 do not include Doppler studies.

Doppler echo (CPT® +93320 and CPT® +93325), if performed, may be reported separately in addition to the primary SE codes: CPT® 93350 or CPT® 93351.

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3D Echocardiography (CD-2.9)

CD.EC.0002.9.A
v1.0.2027

Criteria

Echocardiography with 3-dimensional (3D) rendering is becoming universally available, yet its utility remains limited based on the current literature.

- CPT ® 93319 with one of the following (CPT® 93303, 93304, 93312, 93314, 93315, or 93317) for is considered medically necessary to evaluate congenital cardiac abnormalities
- 3D Echo (CPT® 76376 or CPT® 76377) is considered medically necessary when **one** of the following is needed:
  - left ventricular volume and left ventricular ejection fraction assessment when measurements are needed for treatment decision (e.g., implantation of ICD, alteration in cardiotoxic chemotherapy, cardiac transplant)
  - mitral valve anatomy specifically related to mitral valve stenosis
  - pre-procedural evaluation of left atrial appendage occlusion
  - pre-operative evaluation for LVAD implant
  - guidance of transcatheter procedures such as:
    - mitral valve clipping
    - TAVR
    - left atrial appendage closure device

Evidence Discussion

- 3D echocardiography (3DE) is a newer modality of ultrasonic examination of the heart through the chest wall or through the esophagus that is added on to either a transthoracic or transesophageal echocardiogram.
- This allows for both real-time and post-processed 3D analysis of the cardiac structures and function. This produces images that are less constrained than that of 2D echocardiograms.
- 3DE is readily accessible and transportable allowing for the test to be done at multiple different locations with no need for blood work or IV line insertion.
- 3DE has become important in pre-surgical planning, guidance of catheter intervention, and functional assessment of the heart in various cardiac conditions including but not limited to congenital heart disease, valvular disease, and structural heart disease.

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3D Echocardiography – Coding

Code	Description
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
+93319	3D echocardiographic imaging and post-processing during transesophageal echocardiography, or during transthoracic echocardiography for congenital cardiac anomalies, for the assessment of cardiac structure(s) (e.g., cardiac chambers and valves, left atrial appendage, interatrial septum, interventricular septum) and function, when performed (List separately in addition to code for echocardiographic imaging) Code with (93303-93304, 93312, 93314, 93315, 93317, 93350-93351)

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Myocardial Strain Imaging (CD-2.12)

CD.EC.0002.12.A
v1.0.2027

Criteria

CPT® 93356

- Myocardial strain imaging (CPT® 93356, speckle tracking longitudinal strain) is considered medically necessary for the initial evaluation of LVH, in addition to the primary echocardiogram, when there is documentation of **both**:
  - unclear etiology of LVH not due to hypertensive heart disease
  - concern for infiltrative cardiomyopathy
- Myocardial strain imaging is considered medically necessary in heart transplant evaluation and surveillance per transplant protocol.
- Myocardial strain imaging (CPT® 93356) in addition to the primary echocardiogram in individuals receiving therapy with cardiotoxic agents for **any** of the following:
  - Initial evaluation-prior to treatment with **either**:
    - medications that could result in cardiotoxicity/heart failure
    - radiation that could result in cardiotoxicity/heart failure
  - re-evaluation of an individual previously or currently undergoing therapy as per echocardiogram parameters (see **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1))**
  - re-evaluation of an individual undergoing therapy with worsening symptoms

Evidence Discussion

- Myocardial strain imaging or speckle-tracking echocardiography (STE) is a modern ultrasound technique that is an adjunct to traditional transthoracic echocardiography to evaluate myocardial deformation.
- Given the ultrasound modality, there is no exposure to ionizing radiation or concern for contrast-induced renal failure.
- The main areas of application of this technique have been in the assessment of myocardial mechanics, ischemic heart disease, cardiomyopathies, LV diastolic dysfunction, and in detecting sub-clinical myocardial dysfunction in individuals undergoing chemotherapy for cancer or in those affected by heart valve diseases.
- STE is considered the optimal deformation parameter for the detection of subclinical LV dysfunction which allows for clinical intervention prior to reduction in LVEF particularly useful in the field of cardio-oncology.

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CD.EC.0002.A
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Nuclear Cardiac Imaging

Guideline

Myocardial Perfusion Imaging (MPI)(CD-3.2)
MUGA Study (CD-3.4)
Myocardial Sympathetic Innervation Imaging in Heart Failure (CD-3.6)
Non-imaging Heart Function and Cardiac Shunt Imaging (CD-3.7)
Myocardial Tc-99m Pyrophosphate Imaging in Cardiac Amyloidosis (CD-3.8)
References (CD-3)

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Myocardial Perfusion Imaging (MPI) (CD-3.2)

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MPI Other Indications

Criteria

Medically Necessary

See: **Stress Testing with Imaging – Indications (CD-1.4)**

Not Medically Necessary

Absolute quantitation of myocardial blood flow obtained by CZT-SPECT (AQMBF) (SPECT) is considered experimental, investigational, or unproven at this time.

Nuclear Cardiac Imaging Procedure Codes

- The most commonly performed myocardial perfusion imaging are single (at rest or stress, CPT® 78451) and multiple (at rest and stress, CPT® 78452) SPECT studies. Less commonly ordered are planar studies (CPT 78453 and 78454) see **Stress Testing with Imaging – Criteria (CD-1.4)**.
  - Evaluation of the individual's left ventricular wall motion and left ventricular ejection fraction are routinely performed during MPI and are included in the code's definition.
  - First pass studies, (CPT® 78481 and CPT® 78483), MUGA, (CPT® 78472 and CPT® 78473) and SPECT MUGA (CPT® 78494) should not be reported in conjunction with MPI codes.
  - Attenuation correction, when performed, is included in the MPI service by code definition. No additional code should be assigned for the billing of attenuation correction.
- **Multi-day Studies:** In the absence of written payer guidelines to the contrary, it is not appropriate to bill separately for the rest and stress segments of MPI even if performed on separate calendar dates. A single code is assigned to define the entire procedure on the date all portions of the study are completed.

Evidence Discussion

Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of

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myocardial perfusion imaging (MPI) with single photon emission computed tomography (SPECT) for individuals with signs or symptoms consistent with coronary artery disease (CAD) such as typical angina. In addition, they support the use of SPECT perfusion imaging in symptomatic individuals with known CAD and those with prior interventions such as coronary artery bypass surgery, coronary stenting, and preoperative risk stratification.

Also, as supported by society guidelines, use of SPECT is medically necessary in detection of cardiac transthyretin amyloidosis (ATTR) after light chain amyloidosis (AL) is ruled out by appropriate blood and urine testing.

Coding

Codes	Description®
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
78453	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78454	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
+0742T	Absolute quantitation of myocardial blood flow (AQMBF), single-photon emission computed tomography (SPECT), with exercise or pharmacologic stress, and at rest, when performed (List separately in addition to code for primary procedure)

Note:

3D rendering should not be billed in conjunction with MPI.

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MUGA Study (CD-3.4)

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Criteria

MUGA (Multi Gated Acquisition) – Blood Pool Imaging is considered medically necessary for any of the following:

- recent TTE was technically limited and prevented accurate assessment of left ventricular function
- there is a significant discrepancy between LVEF assessment by TTE and another modality (i.e., one study reports normal LVEF and the other, a reduced LVEF) AND there is clear documentation as to how quantitative measurement of LVEF will affect individual management (e.g., implantation of an ICD, alteration in cardiotoxic chemotherapy, etc.).
- in place of a TTE in the following circumstances:
  - to determine candidacy for ICD/CRT and/or to determine optimal choice of device in individuals who meet criteria for ICD based on left ventricular ejection fraction and other criteria
  - when previously or currently undergoing therapy with potentially cardiotoxic agents, including chemotherapy and radiation, AND a history of previous low left ventricular ejection fraction (LVEF <50%). See **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1)**.

Right ventricular first pass study

- (CPT® 78472 and 78496) is considered medically necessary when ECHO is technically limited and prevents accurate assessment of RV function AND when further information about RV function is needed to guide management (e.g., established/diagnosed pulmonary hypertension, suspected or confirmed pulmonary embolus).

First pass studies

- First pass studies (CPT® 78481 and CPT® 78483) is considered medically necessary in place of MUGA when criteria are met for MUGA and/or there is need for information that cannot be obtained by MUGA.
- First pass studies, (CPT® 78481 and CPT® 78483), MUGA (CPT® 78472 and CPT® 78473), and SPECT MUGA (CPT® 78494) should not be reported in conjunction with MPI codes.

Not medically necessary

MUGA is not considered medically necessary to compare LVEF by the same modality because the prior study was a MUGA.

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Evidence Discussion

Multi-gated acquisition (MUGA) imaging (also referred to as radionuclide angiography, gated blood pool scan, equilibrium radionuclide angiography) is a method to measure left ventricular ejection fraction and wall motion of the heart. Echocardiography is the preferred method of following left ventricular systolic function.

Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of planar imaging and/or single photon emission computed tomography (SPECT) of labeled red blood cells for individuals who require accurate assessment of left ventricular ejection fraction and/or wall motion when echocardiography or other imaging approaches are inadequate or disparate. This includes individuals with cardiomyopathy and those exposed to cardio-toxic agents.

Multi-gated Acquisition (MUGA) Coding (CD-3.3)

Cardiac blood pool imaging, or radionuclide ventriculography, can be used to evaluate ventricular function. Cardiac blood pool imaging includes first pass studies (CPT® 78481 and 78483) as well as gated equilibrium studies (CPT® 78472, 78473, 78494, and +78496).

Gated equilibrium studies can also be referred to as multi-gated acquisition (MUGA) scan or equilibrium radionuclide angiography (ERNA). Imaging for gated equilibrium studies can be planar or 3D (single photon emission computed tomography, SPECT).

Of note, all cardiac blood pool imaging is synchronized with electrocardiographic RR interval (EKG-gated); thus, regular rhythm is required for accurate LV assessment.

- The technique employed for a MUGA service guides the code assignment.
  - CPT® 78472 is used for a planar MUGA scan at rest or stress.
  - CPT® 78473 for planar MUGA scans, multiple studies at rest and stress.
- Planar MUGA studies (CPT® 78472 and CPT® 78473) should not be reported in conjunction with:
  - SPECT MPI (CPT® 78451-CPT® 78454)
  - First pass studies (CPT® 78481-CPT® 78483)
  - SPECT MUGA (CPT® 78494).
- CPT® +78496 is assigned only in conjunction with CPT® 78472.

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Code	Description
Gated Equilibrium Studies – Planar	
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78473	Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification
Gated Equilibrium Studies-SPECT	
78494	Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing
First Pass studies	
78481	Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
+78496	Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure)

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Myocardial Sympathetic Innervation Imaging in Heart Failure (CD-3.6)

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Criteria

- Nuclear imaging using I-123-meta-iodobenzylguanidine (I-123-mIBG) in an attempt to image increased myocardial sympathetic activity is considered to be experimental and investigational.
- The AMA has established the following set of Category III codes to report these studies:
  - CPT® 0331T Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment
  - CPT® 0332T Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT

Evidence Discussion

I-123-meta-iodobenzylguanidine (MIBG) imaging of the sympathetic nerve activity of the heart has been proposed and approved for the identification of individuals with heart failure. However, its clinical utility has not found widespread acceptance, and its clinical usefulness remains in question. There are no societal guidelines for its routine use. The guidelines contain many other imaging platforms such as echocardiography, magnetic resonance imaging, perfusion, and metabolic imaging that have proven superior for the diagnosis and management of individuals with heart failure.

Coding

Code	Description
0331T	Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment;
0332T	Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT

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Non-imaging Heart Function and Cardiac Shunt Imaging (CD-3.7)

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Criteria

- Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete but are considered medically necessary when other preferred modalities are unavailable or non-diagnostic.
- Echocardiogram is the preferred method for cardiac shunt detection, rather than the cardiac shunt imaging study described by CPT® 78428.
- Left ventricular ejection fraction can be obtained by echocardiogram, SPECT MPI, MUGA study, cardiac MRI, cardiac CT, or cardiac PET depending on the clinical situation, rather than by the non-imaging heart function study described by CPT® 78414.

Evidence Discussion

Non-imaging Heart Function and Cardiac Shunt Imaging radionuclide techniques are no longer in use in current clinical practice. These techniques have been rendered obsolete and have been replaced by other cardiac imaging modalities that provide far superior structural and functional information to guide clinical management decisions. The preferred cardiac imaging modalities in current clinical use that have replaced the obsolete techniques include echocardiography, SPECT MPI, MUGA study, cardiac MRI, cardiac CT, and cardiac PET.

Coding

Codes	Description
78414	Determination of central c-v hemodynamics (non-imaging) (eg, ejection fraction with probe technique) with or without pharmacologic intervention or exercise, single or multiple determinations
78428	Cardiac shunt detection

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Myocardial Tc-99m Pyrophosphate Imaging in Cardiac Amyloidosis (CD-3.8)

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Criteria

CPT® 78469, 78803, or 78830

Tc-99m pyrophosphate imaging is considered medically necessary to diagnose cardiac ATTR in an individual with no history of an MI in the 4 weeks preceding the test when **any** of the following conditions exist:

- Serum kappa/lambda free light chain ratio or Serum or urine immunofixation electrophoresis screening excludes presence of a monoclonal light chain process i.e., AL amyloidosis
- cardiac MRI or echocardiography findings suggest cardiac amyloidosis
- individual has known systemic amyloidosis
- individual is ATTR gene positive
- suspected cardiac ATTR amyloidosis when there is a contraindication to CMR such as renal insufficiency or an implantable cardiac device

Note:

Cardiac follow-up should be based on Echocardiogram, Tn, NT-proBNP, clinical exam and symptom

Background and Supporting Information

- The following conditions would raise high index of suspicion:
  - left ventricular hypertrophy but low voltage on ECG
  - heart failure with preserved left ventricular ejection fraction and an increase in left ventricular wall thickness
  - unexplained heart failure with preserved left ventricular ejection fraction and concomitant right heart failure in an individual over the age of 60
  - individuals, especially elderly males, with signs/symptoms of heart failure and any of the following:
    - lumbar spinal stenosis
    - spontaneous biceps tendon rupture
    - bilateral carpal tunnel syndrome
    - atrial arrhythmia in the absence of usual risk factors

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- known or suspected familial amyloidosis
- low flow, low gradient aortic stenosis

Evidence Discussion

Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of myocardial perfusion imaging (MPI) with single photon emission computed tomography (SPECT) for individuals with signs or symptoms consistent with coronary artery disease (CAD) such as typical angina. In addition, they support the use of SPECT perfusion imaging in symptomatic individuals with known CAD and those with prior interventions such as coronary artery bypass surgery, coronary stenting, and preoperative risk stratification. These guidelines balance the appropriate testing of individuals with SPECT versus unnecessary and potentially harmful testing and downstream procedures.

Also, as supported by society guidelines, use of SPECT is medically necessary in detection of cardiac transthyretin amyloidosis (ATTR) after light chain amyloidosis (AL) is ruled out by appropriate blood and urine testing.

Coding

Codes	Cardiac Pyrophosphate Scan
78800	Radiopharmaceutical Localization Imaging Limited area
78466	Myocardial imaging, infarct avid, planar; qualitative or quantitative
78468	Myocardial imaging, infarct avid, planar; with ejection fraction by first pass technique
78469	Myocardial imaging, infarct avid, planar; tomographic SPECT with or without quantification
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) , single area (eg, head, neck, chest, pelvis), single day imaging

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Codes	Cardiac Pyrophosphate Scan
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging

- Historically this method of imaging the myocardium was used to identify recent infarction, hence, the term "infarct-avid scan." Although still available, the sensitivity and specificity for identifying infarcted myocardial tissue are variable and the current use for this indication is limited. See **Cardiac MRI (CD-5)**.
- Tc-99m pyrophosphate imaging (CPT® 78469, 78803, or 78830) is medically necessary to identify cardiac amyloidosis.
- Chest SPECT and planar imaging may be used, as well as whole-body imaging for identification of systemic ATTR (transthyretin) amyloidosis.
- For a single planar imaging session alone (without a SPECT study), report CPT® 78800 Radiopharmaceutical Localization Imaging Limited area
- Note: When reporting CPT 78803, planar imaging of a limited area or multiple areas should be included with the SPECT

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Cardiac CT

Guideline

CT for Coronary Calcium Scoring (CD-4.2)
Coronary CT Angiography (CCTA) (CD-4.3)
CCTA – Regardless of Symptoms (CD-4.4)
Anatomical and Functional Analysis of CCTA Results (CD-4.5)
CT Heart for Evaluation of Cardiac Structure and Morphology (CD-4.6)
CT Heart for Congenital Heart Disease (CD-4.7)
Transcatheter Aortic Valve Replacement (TAVR) (CD-4.8)
3D Predictive Model Generation for Pre-planning of Cardiac Procedure (CD-4.9)
Cardiac CT and CTA- Coding (CD-4.1)
References (CD-4)

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CT for Coronary Calcium Scoring (CD-4.2)

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Criteria

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CT Calcium Scoring-Asymptomatic and for CAD Screening

ASCVD Risk Score (Pooled Cohort Equation)

- Coronary artery calcium score is considered medically necessary when there is documentation of **all** of the following:
  - Results will impact risk-based decisions for preventive interventions.
  - an LDL-C level ≥70 mg/dL (1.8mmol/L) **and** <190mg/dL (4.9mmol/L)
  - Individual is an adult age 40-75
  - 10-year ASCVD risk including pooled cohort equation is between 5.0% to 19.9%
  - There is no documented CAD.
  - Individual is not currently on a statin.
  - Individual is not a tobacco smoker.
  - There is no history of diabetes.
  - There is no family history of premature CAD (occurring before age 56 in males or before age 66 in females).
  - There has been no calcium score performed in the previous 5 years.
  - There has been no prior calcium score >0

OR

PREVENT score

Coronary artery calcium score is considered medically necessary when there is documentation of **all** of the following:

- PREVENT score is 3% to 5%
- there is consideration for lipid lowering therapy
- individual is 30-79 years of age

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Repeat calcium scoring

Repeat CT calcium scoring is considered medically necessary when ASCVD risk >5%, there is no documented CAD, and when the results will help determine whether current lipid-lowering therapy should be intensified

Suspected or Known Low Gradient Aortic Stenosis

- Coronary artery calcium score is considered medically necessary in low gradient aortic stenosis when symptomatic, severe aortic stenosis is suspected. Low gradient aortic stenosis is defined as an AVA <1 and a mean gradient <40mmHg.

Individuals with a History of Chest Radiation Therapy

CT calcium scoring is considered medically necessary to evaluate for radiation induced CAD when all of the following conditions exist:

- no presence of symptoms suspicious for ischemia such as chest discomfort located retrosternally, epigastric, or referred pain (pain that is felt in a place different than the source) in the neck, shoulder, arm, or jaw described as pain, pressure, constricting, or tightness occurring with exertion or emotional stress and relieved by rest, nitroglycerin, or both.
- no clinical history or prior cardiac imaging documenting CAD.
- no prior calcium score >0.
- for the initial study, there has been at least 5 years since the last RT (radiotherapy/radiation) treatment or for subsequent testing, there has been at least 5 years since the last CT calcium scoring.

Not Medically Necessary

Evaluation of Known CAD

Coronary calcium scoring is considered **not** medically necessary in an individual with known CAD.

Evaluation of Suspected CAD in Symptomatic Individuals

CT calcium score is considered **not** medically necessary for the evaluation of CAD in symptomatic individuals.

Evidence Discussion

Coronary artery calcium (CAC) scoring is an established imaging modality for detection of subclinical coronary atherosclerosis. Contemporary multisociety guidelines identify CAC scoring as a decision-modifying tool when traditional risk assessment is inconclusive. Unlike risk calculators alone, CAC directly measures atherosclerotic burden, thereby linking diagnostic findings to future cardiovascular event risk.

Coronary artery calcium (CAC) scoring is supported by moderate-quality evidence demonstrating a strong and graded association with atherosclerotic cardiovascular

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disease (ASCVD) events. Multisociety guidelines recommend CAC testing in primary prevention populations to further refine risk stratification when clinical risk assessment alone is insufficient to guide lipid-lowering therapy decisions . Although evidence is primarily derived from observational cohort data, the consistency of risk prediction have led to Class I and IIa recommendations. CAC directly measures atherosclerotic burden, thereby linking diagnostic findings to future cardiovascular event risk. This supports differentiation of individuals who would benefit from lipid-lowering therapy from those in whom deferral of therapy would be appropriate (Blumenthal et al., 2026).

In addition to CAC, the degree of calcification of the aortic valve has been demonstrated to correlate with the degree of aortic stenosis and prognosis. The utility of calcium scoring has been extended to the aortic valve in the setting of symptomatic, low gradient aortic stenosis (defined as an aortic valve area of less than 1cm^2 and mean gradient of less than 40mmHg), when severe aortic stenosis is suspected.

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Coronary CT Angiography (CCTA) (CD-4.3)

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Criteria

CCTA (CPT® 75574)

CCTA is considered medically necessary for any of the following:

- new, recurrent, or worsening cardiac chest pain as defined in **General Guidelines (CD-1.0)**
- new, recurrent, or worsening symptoms of chest pain, or unexplained exertional dyspnea, or unexplained exertional fatigue, and any of the following:
  - Symptoms persist after a normal stress test.
  - equivocal, borderline, abnormal or discordant prior noninvasive evaluation since the onset of symptoms where obstructive coronary artery disease remains a concern
  - new abnormal rest ECG findings since the onset of symptoms, such as a new LBBB or T-wave inversions (not including isolated T wave inversion in III or leads v1-2), when ischemia is a concern
  - a history of prior CABG when the **only** concern is for graft patency
  - Individual has undergone an urgent evaluation (ER or urgent care) of the symptoms since the onset.
  - history of cardiac transplant (e.g., concern for transplant vasculopathy)
  - history of chest radiation therapy
  - chest pain occurring with syncope
  - coronary artery calcium score (CAC) score ≥100
  - individuals 50 years of age or above with 2 or more of the following CV risk factors:
    - diabetes
    - tobacco smoker
    - family history of premature CAD in a first-degree relative (biologic parent, sibling, or child)
    - hypertension
    - hyperlipidemia
    - history of adverse pregnancy outcomes (APOs)

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  - Prior history of PCI (percutaneous coronary intervention) or CABG (coronary artery bypass graft surgery) or a history of obstructive CAD as defined in **General Guidelines (CD-1.0) and any** of the following:
    - Cardiac chest pain as defined in **General Guidelines (CD-1.0)**
    - Anginal equivalents such as atypical chest pain, exertional dyspnea or exertional fatigue
    - Symptoms similar to prior ischemic episode
- Evaluation of an individual under the age of 40 for suspected anomalous coronary artery(ies) or for treatment planning when there is a history of one or more of the following:
  - syncopal episodes during strenuous activities
  - persistent chest pain brought on by exertion or emotional stress and normal stress test
  - full sibling(s) with history of sudden death syndrome before age 40 or with documented anomalous coronary artery
  - resuscitated sudden death and contraindications for conventional coronary angiography
  - prior nondiagnostic coronary angiography in determining the course of the anomalous coronary artery in relation to the great vessels, origin of a coronary artery or bypass graft location (any):
    - Anomalies of origin:
      - LCA or the RCA arising from the pulmonary artery
      - interarterial course between the pulmonary artery and the aorta of either the RCA arising from the left sinus of Valsalva or the LCA arising from the right sinus of Valsalva
    - Anomalies of course:
      - myocardial bridging
    - Anomalies of termination:
      - coronary artery fistula
- Initial imaging study in individuals with hypertrophic cardiomyopathy and stable anginal symptoms
  - Chest discomfort is common in individuals with hypertrophic cardiomyopathy. The incidence of false positive myocardial perfusion imaging abnormalities is higher in these individuals, whereas the incidence of severe coronary artery stenosis is low.
- Individuals who have recovered from unexplained sudden cardiac arrest in lieu of invasive coronary angiography **(both)**:
  - confirm the presence or absence of ischemic heart disease
  - exclude the presence of an anomalous coronary artery

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CCTA – Regardless of Symptoms (CD-4.4)

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Criteria

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- Evaluation of newly diagnosed heart failure or cardiomyopathy (all):
  - No prior history of coronary artery disease, the left ventricular ejection fraction is <50%
  - No contraindications to cardiac CT angiography
  - No cardiac catheterization, SPECT, cardiac PET, or stress echocardiogram has been performed since the diagnosis of heart failure or cardiomyopathy.
- Unclear coronary artery anatomy despite conventional cardiac catheterization
- Evaluation of structural heart disease or CAD for use of class IC antiarrhythmic agent (flecainide or propafenone) in place of stress test with imaging
- Ventricular tachycardia (3-beat runs or greater), exercise induced ventricular tachycardia or ventricular fibrillation
- Re-do CABG **(either)**:
  - assess bypass graft patency
  - evaluate the location of the left internal mammary artery (LIMA) and or right internal mammary artery (RIMA) prior to repeat bypass surgery
- Follow-up Left main stent 1 time at 6-12 months
- Pre-procedural planning for Percutaneous Coronary Intervention (PCI) of Chronic Total Occlusion (CTO)
- Evaluate coronary artery anomalies and other complex congenital heart disease of cardiac chambers or great vessels:
  - To evaluate the great vessels, CTA Chest (CPT® 71275) can be performed instead of CCTA or in addition to CCTA.
  - For anomalous pulmonary venous return, can add CT Abdomen and Pelvis with contrast (CPT® 74177).
  - See **Adult Congenital Heart Disease CD-11** for lesion specific imaging.
- When CCTA will replace conventional invasive coronary angiography for any of the following:
  - Delayed presentation or retrospective evaluation of suspected Takotsubo syndrome (stress cardiomyopathy)

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- Preoperative assessment of the coronary arteries in planned surgery for any of the following:
  - Aortic dissection
  - Aortic aneurysm
  - Valvular surgery
  - Liver transplant (for initial pre-transplant evaluation and may be repeated once in 3 years)
- To assess for coronary involvement in individuals with systemic vasculitis (e.g. Giant Cell Arteritis, Takayasu's, Kawasaki's disease) when there are clinical features suggestive of underlying vasculitis including:
  - unexplained elevated cardiac markers (erythrocyte sedimentation rate, C-reactive protein)
  - constitutional symptoms (fever, chills, night sweats, weight loss)
  - multiple visceral infarcts in the absence of embolic etiology

- For **Cardiac Trauma**, see also **Cardiac Trauma – Imaging (CD-10.1)**.
- Preoperative assessment for either:
  - planned liver or kidney transplant
  - in place of stress testing with imaging for high-risk or intermediate-risk surgery as follows:
    - **High-risk Surgery:** An imaging stress test is considered medically necessary when any of these conditions apply:
      - it has been one year or more since the last imaging stress test
      - new cardiac symptoms have developed since the last imaging stress test
      - new EKG changes have developed since the last imaging stress test
    - **Intermediate-risk Surgery:** An imaging stress test is considered medically necessary when **all** of the following apply:
      - individual is unable to perform an ETT
      - it has been one year or more since the last imaging stress test **or** new cardiac symptoms have developed since the last imaging stress test **or** new EKG changes have developed since the last imaging stress test
      - clinical history documents **one** of the following clinical risk factors for cardiac death and non-fatal MI at time of non-cardiac surgery:
        - ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
        - compensated heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral fine crackles, chest x-ray showing heart failure)
        - previous TIA or stroke
        - diabetes mellitus
        - creatinine level >2mg/dL

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- **Low-risk:** Pre-operative imaging stress testing is considered not medically necessary.

High-risk (> 5%)	Intermediate-risk (1-5%)	Low-risk (<1%)
• Open aortic and other major open vascular surgery • Open peripheral vascular surgery • Esophagectomy • Pneumonectomy • Open intraperitoneal and/or intrathoracic surgery with organ resection	• Open intraperitoneal and/or intrathoracic surgery without major organ resection • Open carotid endarterectomy • Head and neck surgery • Open orthopedic surgery • Open prostate surgery	• Endoscopic procedures • Superficial procedures • Cataract surgery • Breast surgery • Ambulatory surgery • Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention

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Anatomical and Functional Analysis of CCTA Results (CD-4.5)

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Criteria

Fractional flow reserve by computed tomography

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Fractional flow reserve (FFR) is typically measured using invasive techniques. FFR can be obtained non-invasively from coronary computed tomography angiography data (FFR-CT).

- Criteria:
  - FFR-CT is considered medically necessary to further assess CAD seen on a recent CCTA that is of uncertain physiologic significance

Coronary CTA plaque quantification

CPT® 75577

Coronary CT plaque quantification or coronary plaque analysis using data from CCTA is considered medically necessary when **all** of the following conditions exist:

- The individual has acute or stable chest pain with no known coronary artery disease (CAD)
- Results from the current completed and interpreted CCTA indicate any of the following risk categories:
  - intermediate risk
  - CAD-RADS 1
  - CAD-RADS 2
  - CAD-RADS 3
- Cardiac evaluation is negative or inconclusive for acute coronary syndrome.

Not medically necessary

- Coronary CTA plaque quantification or coronary plaque analysis using data from CCTA is not considered medically necessary in any of the following clinical scenarios:
  - unstable coronary syndromes
  - in conjunction with invasive coronary catheterization
  - for the purpose of screening or disease surveillance
  - within 30 days of a myocardial infarction

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- Current completed and interpreted CCTA documents any of the following results:
  - Normal CCTA
    - CAD-RADS-0
  - High-grade stenosis
    - CAD-RADS-4
    - CAD-RADS-5

Note:

See **General Guidelines CD 1.0** for **CAD-RADS** classifications

Evidence Discussion

Coronary Computed Tomography Angiography (CCTA) provides non-invasive anatomic coronary imaging with excellent sensitivity for detecting coronary plaques and stenosis. However, artifacts can significantly lower the specificity, which potentially leads to higher healthcare resource utilization. Notwithstanding this concern, the ability to characterize coronary plaques and stenosis on a CCTA proved to be advantageous over functional stress testing, with respect to diagnostic characteristics and prognostication, as demonstrated by high-quality evidence, including multiple randomized trials.

To ensure a clinically meaningful study, in addition to paying meticulous attention to the scanner functionality and protocol selection, careful individual selection is imperative. Based on the known performance characteristics of CCTA and high-quality clinical trials from Europe and North America, there is general agreement between the American and European guidelines to focus CCTA testing on the following general categories:

- Cardiac chest pain with no known coronary artery disease (CAD)
- Absence of symptoms or possible cardiac chest pain with no known CAD, when objective evidence of cardiac structure or function abnormality is present
- Information about specific coronary artery abnormalities, such as left main coronary stent and bypass graft patency, congenital coronary anomaly, non-atherosclerotic coronary disease may potentially alter clinical management decision.
- CCTA will replace conventional invasive coronary angiography when the likelihood of coronary intervention is not high based on clinical assessment.

CTA derived fractional flow reserve (FFRct) is one of the value-added technologies that have been shown to improve the accuracy of CAD diagnosis over and above CCTA alone. While it modestly adds negative predictive value to CCTA by excluding critical coronary lesion with a FFRct value >0.8, the positive predictive value is inadequate to confer confidence to locate lesions with significant stenosis. Effective adoption of this technology, therefore, is contingent upon ensuring optimal CCTA image quality and a

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mindful individual selection process; for example, avoid applying FFRct to those with left main coronary disease ≥50% or those with critical triple vessel disease.

Coronary Plaque Analysis (AI-QCT/AI-CPA) using coronary computed tomography angiography (CCTA) is an adjunctive tool used to assess intermediate risk plaque or CAD-RADS1 to CAD-RADS 3 category on CCTA done on individuals with chest pain and no known coronary artery disease. Multiple software have been developed as an adjunct to CCTA to aid in the visualization, characterization, and to improve accuracy of this assessment. This is intended to improve clinical diagnosis and management of CAD.

AI-CPA is currently being used to help stage medical treatment based on severity of plaque and to help predict those who are increased risk for ACS. It has also been shown to be consistent with consistent with invasive fractional flow reserve and intravascular ultrasound (IVUS). It is best used to target those most susceptible to acute coronary syndrome and to guide preventative measures of coronary artery disease.

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CT Heart for Evaluation of Cardiac Structure and Morphology (CD-4.6)

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Criteria

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CT Cardiac for structure and morphology is considered medically necessary as follows:

- Cardiac vein identification for lead placement in left ventricular pacing
- To evaluate the anatomy of the pulmonary veins prior to a pulmonary vein isolation (ablation) procedure for atrial fibrillation
  - Post-procedure between 3-6 months after ablation

Note:

See also **Initial Transthoracic Echocardiography (TTE) Indications (PEDCD-8.2)**

- If echocardiogram is inconclusive for:
  - cardiac or pericardial tumor or mass
  - cardiac thrombus
  - pericarditis/constrictive pericarditis
  - complications of cardiac surgery
- In place of MRI when there is clinical suspicion of arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC) if the clinical suspicion is supported by established criteria. For ARVD, see **Cardiac MRI – Indications (excluding Stress MRI) (CD-5.2).**
- Recurrent laryngeal nerve palsy due to cardiac chamber enlargement
- Prior to planned valvular interventions (TAVR, TMVR and TTVR) in individuals with radiation-induced valve disease
- CT Cardiac Morphology is considered medically necessary instead of TEE for assessment of left atrial appendage (LAA) occlusion device or to assess for thrombus. See: **Transesophageal Echocardiography (TEE) – Indications (CD-2.5).**
  - pre-procedural evaluation
  - repeat imaging 45 days post-procedure
    - Another follow-up study is medically necessary before the 1-year surveillance when the imaging study at 45 days shows a peri-device gap ≥5 mm or Device Related Thrombus usually at 3-6 months.

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- 1 year post-procedure

Evidence Discussion

Cardiac CT for structure and morphology is an effective alternative or complement to echocardiography and CMR when image windows are limited or when comprehensive 3D anatomic definition is required, enabling evaluation of cardiac masses, pericardial disease, pulmonary veins, coronary venous anatomy for lead planning, and left-atrial appendage (LAA) occlusion devices (Otto et al., 2021; Blanke et al., 2019; Korsholm et al., 2020).

Compared with TEE or CMR, CT offers consistent visualization of posterior structures and calcification, facilitates annular sizing and spatial planning for structural interventions, and provides rapid high-resolution datasets that can alter procedural strategy. Modality selection should weigh iodinated contrast and radiation exposure against the expected management impact (Blanke et al., 2019; Otto et al., 2021; Korsholm et al., 2020).

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CT Heart for Congenital Heart Disease (CD-4.7)

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Criteria

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CT Cardiac for evaluation of cardiac structure and morphology in the setting of congenital heart disease is considered medically necessary for any of the following:

- Coronary artery anomaly evaluation when cardiac catheterization did not identify all coronary arteries
- Thoracic arteriovenous anomaly evaluation when MRI Cardiac or CTA Chest suggested congenital heart disease
- Complex adult congenital heart disease evaluation when either of the following applies:
  - No CT Cardiac or MRI Cardiac has been performed, and there is a contraindication to MRI Cardiac.
  - A CT Cardiac or MRI Cardiac was performed 1 year ago or more.
- See also section **Adult Congenital Heart Disease (CD-11)**

Evidence Discussion

In adults with congenital heart disease, cardiac CT is valuable when rapid, high-resolution definition of complex anatomy is necessary or when CMR is contraindicated or nondiagnostic; key use cases include coronary artery anomaly definition, thoracic arteriovenous anomalies, and complementary planning for complex repairs (Stout et al., 2019; Kim et al., 2006; Gräni et al., 2017).

CT complements CMR and echocardiography by clarifying extracardiac vascular pathways, coronary origins/courses, conduit relationships, and calcification, which can directly affect interventional or surgical planning (Sachdeva et al., 2024; Stout et al., 2019).

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Transcatheter Aortic Valve Replacement (TAVR) (CD-4.8)

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CT Imaging in Transcatheter Aortic Valve Replacement (TAVR)

Criteria

Pre-TAVR imaging

Pre-aortic valve replacement

- Once the decision has been made for aortic valve replacement, the following may be used to determine if an individual is a candidate for TAVR:
  - CTA Chest (CPT® 71275), Abdomen and Pelvis (combination code CPT® 74174) are considered medically necessary; and
  - CT Cardiac Morphology (CPT® 75572) is considered medically necessary to measure the aortic annulus; or
  - CTA Cardiac (CPT® 75574) is considered medically necessary to both measure the aortic annulus and assess the coronary arteries in lieu of heart catheterization.
- A repeat diagnostic left heart catheterization is **not** considered medically necessary when the individual is undergoing a transcatheter aortic valve replacement (TAVR).

Transfemoral access not feasible

Alternative imaging can be obtained to evaluate vascular access for TAVR in individuals for whom it is documented either via the office note or prior imaging that transfemoral access would not be feasible due to **any** of the following exclusion criteria:

- small vessels
- highly calcified vessels
- stenosed or occluded vessels
- prior aortoiliac vascular intervention

Imaging is medically necessary based on the documented intended access site (transaxillary or transcarotid) and should be of the involved body areas. The following studies are medically necessary based on the documented planned access site:

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- CTA Head (CPT® 70496) or CTA Neck (CPT® 70498) or CTA Head and Neck (CPT® 70471) for transcarotid access
- CTA Chest (CPT® 71275) and/or Upper Extremity (CPT® 73206) for transaxillary access

Post-TAVR imaging

CT Cardiac (CPT® 75572) is considered medically necessary after TAVR in the setting of **any** of the following:

- post-TAVR TTE is indeterminate or raises a concern about **any** of the following:
  - valve thrombosis
  - infective endocarditis
  - structural degeneration
- A Valve-in-Valve implantation or surgical re-do AVR is being contemplated
- concern for hypoattenuated leaflet thickening (HALT) or other forms of bioprosthetic valve dysfunction due to an increase in mean transvalvular gradient of ≥10mmHg from baseline.
- Routine CT surveillance or follow up for incidental Hypoattenuated Leaflet Thickening (HALT) with or without restricted leaflet motion, also referred to as Hypoattenuation Affecting Motion (HAM), is NOT medically necessary.

Evidence Discussion

The American Heart Association scientific statement recognizes preoperative chest CT as a highly sensitive method for identifying aortic atherosclerosis, an important potential source of embolic stroke during cardiac surgery. In one cohort of 284 patients scheduled for nonemergent coronary artery bypass grafting, CT identified severe atherosclerotic lesions that made cannulation or cross-clamping high risk in 12.7% of patients. The statement notes that myocardial revascularization guidance recommended preoperative CT in those with evidence of extensive generalized atherosclerosis. When severe aortic disease is identified, modification of the operative technique to minimize aortic manipulation and reconsideration of the overall surgical risk-benefit balance are advised. (Gaudino et al., 2020).

A 2026 American College of Radiology review found that a meta-analysis of 18 studies involving 4,057 patients undergoing first-time cardiac surgery suggested that preprocedural CT may reduce perioperative stroke and mortality. The potential benefit was attributed to changes in aortic cannulation site, use of an off-pump approach, or cancellation or modification of surgery when extensive aortic disease was identified. However, much of the evidence was observational, and at least one retrospective case-control study of 405 patients found that aortic calcification was more frequent among patients who developed postoperative stroke, but the differences were not statistically significant.(Malik et al., 2026).

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Observational studies and meta-analyses have reported that preoperative CT is useful before repeat cardiac surgery. CT can identify high-risk anatomy, including extensive aortic calcification and a distance of less than 10 mm between the sternum and the right ventricle, aorta, or bypass graft. Identification of these findings resulted in cancellation of surgery in approximately 4% to 13% of cases and modification of the operative strategy in up to 80%. Other reported benefits included fewer sternal re-entry injuries, shorter perfusion or cross-clamp times, shorter intensive care unit stays, and possible reductions in perioperative myocardial infarction and stroke. Interpretation is constrained by predominantly nonrandomized study designs, differences in surgical populations and CT protocols, and the possibility of selection and surgical-expertise bias (Malik et al., 2026).

Trans-catheter Aortic Valve Replacement (TAVR)

The success of a Trans-catheter Aortic Valve Replacement (TAVR) procedure is contingent upon a meticulous pre-TAVR planning imaging study where cardiac CT allows accurate annulus sizing, coronary heights measurement, and calcification distribution evaluation, in addition to access site planning. Post-operatively, clinically suspected complications such as thrombus formation, infective endocarditis, or structural degeneration can be confirmed on a cardiac CT; a routine surveillance strategy, however, is not supported because of unclear or even potentially harmful outcome of treating incidental findings.

Transcatheter Mitral Valve Repair (mitral valve clip)

In non-interventional settings, cardiac CT provides an alternative to cardiac MRI when structural information cannot be adequately obtained by an echocardiography. Most notably, the evaluation of a cardiac mass, extent of pericardial disease, complex congenital heart disease and cardiomyopathy, can be performed by a cardiac CT when cardiac MRI is not available or contraindicated. Percutaneous treatment of mitral regurgitation can be accomplished using venous access to apply a clip device (e.g., MitraClip currently FDA approved) to provide edge-to-edge mitral leaflet coaptation, approximating opposing sections of the anterior and posterior mitral valve leaflets. FDA approved indications include treatment for individuals with symptomatic, moderate to severe, or severe primary mitral regurgitation whose surgical risks are prohibitive, as well as symptomatic moderate to severe or severe secondary mitral regurgitation who have failed optimal medical therapy. This therapy should include, if medically necessary, cardiac resynchronization therapy.

Transcatheter Mitral & Tricuspid Valve Replacement

Transcatheter Tricuspid Valve Replacement device (EVOQUE) is currently FDA approved. In individuals being considered for transcatheter tricuspid or mitral valve replacement, Cardiac CT (CPT® 75572) provides detailed imaging of the valve annulus including measurement of valve annulus to guide selection of the

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appropriate-sized valve. CTV Chest (CPT® 71275) and CTV Abdomen and Pelvis (CPT® 74174) provide imaging of the iliac veins and inferior vena cava to exclude stenosis or significant tortuosity and aid in determining eligibility and procedure planning.

Coding

Code	Description
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
73206	Computed tomographic angiography, upper extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)

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Code	Description
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)

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3D Predictive Model Generation for Pre-planning of Cardiac Procedure (CD-4.9)

CD.CT.0004.9.A
v1.0.2027

Criteria

3D predictive model generation for pre-planning of a cardiac procedure, using data from cardiac computed tomographic angiography is considered to be experimental, investigational, or unproven.

Evidence Discussion

Cardiac Computed Tomography Angiography is a 3D imaging acquisition, viewing, and reporting system. Standard Cardiac Computed Tomography Angiography includes the viewing of 3D images. Currently, there is not enough data to support the use of 3D predictive model generation for pre-planning of cardiac procedures. It has not been shown to improve outcomes when compared with standard Cardiac Computed Tomography Angiography.

Coding

Description	HCPCS
3D predictive model generation for pre-planning of a cardiac procedure, using data from cardiac computed tomographic angiography with report	C9793

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Cardiac CT and CTA- Coding (CD-4.1)

CD.CT.0004.1.A
v1.0.2027

Associated Codes

Cardiac Imaging Procedure Codes

Codes	Description
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
75577	Quantification and characterization of coronary atherosclerotic plaque to assess severity of coronary disease, derived from augmentative software analysis of the data set from a coronary computed tomographic angiography, with interpretation and report by a physician or other qualified health care professional
75580	Noninvasive estimate of coronary fractional flow reserve (FFR) derived from augmentative software analysis of the data set from a coronary computed tomography angiography, with interpretation and report by a physician or other qualified health care professional

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- CPT® 75574 includes evaluation of 3D image post-processing, assessment of cardiac function, and evaluation of venous structures; therefore, additional codes for CT Cardiac and 3D post-processing are not needed

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Cardiac MRI

Guideline

Cardiac MRI and Cardiac Indications for MRA Chest (CD-5.2)
Cardiac Stress MRI - (CD-5.3)
References (CD-5)

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Cardiac MRI and Cardiac Indications for MRA Chest (CD-5.2)

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Cardiac MRI and Cardiac Indications for MRA Chest

Criteria (excludes Stress-perfusion CMR)

- Assess myocardial viability (to differentiate hibernating myocardium from scar) when necessary to determine if revascularization should be performed (CPT® 75561)
- Assessment of global ventricular function, myocardial composition, and mass if a specific clinical question is left unanswered by a recent echocardiogram and results will affect individual management (CPT® 75557 or CPT® 75561). Particularly useful in evaluating:
  - cardiomyopathy (ischemic, nonischemic, diabetic, hypertrophic, or muscular dystrophy)
  - non-compaction
  - infiltrative heart disease such as amyloidosis and sarcoidosis
  - post cardiac transplant
  - hypertrophic cardiomyopathy
  - suspected acute myocarditis, cardiac aneurysm, trauma, and contusions
  - monitoring cancer chemotherapy effect on the heart (especially if an accurate assessment of right ventricular function is documented as necessary)
  - sickle cell disease
- Pre- and post-operative congenital heart disease assessment. See **Adult Congenital Heart Disease (CD-11)** for defect specific indications (CPT® 75557 or 75561).
  - MRA Chest (CPT® 71555) may be added if the aorta or pulmonary artery need to be visualized beyond the root.
  - May add CPT® +75565 in conjunction with CPT® 75557 or 75561, only if there is a need to clarify findings on a recent echocardiogram and cardiac Doppler study when there is documentation of **either** of the following:
    - significant valvular disease that may require intervention
    - intracardiac flow disturbances (e.g., ASD, VSD)
- Assessment of ventricular arrhythmia for ablation planning (CPT® 75557 or 75561)
- Assessment of arrhythmogenic left ventricular cardiomyopathy (ALVC) (CPT® 75557 or 75561)

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- Arrhythmogenic right ventricular dysplasia or arrhythmogenic right ventricular cardiomyopathy (ARVD/ARVC) suspicion (CPT® 75557 or 75561) must have one of the following:
  - non-sustained or sustained VT of LBBB morphology OR >500 PVCs over 24 hours on event recorder or Holter monitor
  - ARVD/ARVC confirmed in a first-degree relative either by criteria, autopsy, pathogenic genetic mutation or sudden death <35 years of age with suspected ARVD/ARVC
  - inverted T waves in right precordial leads (V1, V2 and V3) or beyond in individuals >14 years of age in the absence of complete RBBB
  - right ventricular akinesis, dyskinesis, or aneurysm noted on echo or RV angiography
- Differentiate constrictive pericarditis from restrictive cardiomyopathy (CPT® 75561)
- Evaluate cardiac tumor or mass when echocardiogram is inconclusive (CPT® 75557 or 75561)
- Evaluate valvular heart disease when echocardiogram is inconclusive:
  - CPT® 75557 **or** CPT® 75561
  - May add CPT® 75565 when there is documentation of either of the following:
    - significant valvular disease that may require intervention
    - intracardiac flow disturbances (e.g., ASD, VSD)
- Suspected cardiac thrombus when echocardiogram is inconclusive (CPT® 75557).
- Right ventricular function evaluation (CPT® 75557 in conjunction with CPT® +75565) if there has been a recent ECHO and there is documented need to perform Cardiac MRI in order to resolve an unanswered question about flow dynamics
- Cardiac MRI (CPT® 75557 or 75561) and CMR velocity flow mapping (CPT® 75565) for preoperative evaluation prior to planned LVAD implant
- Shunting through a VSD (CPT® 75557 in conjunction with CPT® +75565) if a recent ECHO has been done, including a bubble study, and there is documented need to perform Cardiac MRI in order to resolve an unanswered question about flow dynamics
- Conditions that would **not** require an ECHO prior to an MRI:
  - detect anomalous coronary arteries (CPT® 75561)
  - assess coronary arteries in Kawasaki disease
  - Fabry disease (CPT® 75561)
  - initial evaluation for cardiac sarcoidosis or iron overload cardiomyopathy (hemosiderosis, hemochromatosis)

Not Medically Necessary

C9762-Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with strain imaging. The use of CMR strain imaging for the

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quantification of segmental dysfunction is considered investigational and experimental at this time.

Quantitative analysis of myocardial tissue composition by MRI (CPT® codes 0648T, 0649T, 0697T and 0698T) are considered experimental, investigational, or unproven at this time. There is insufficient clinical data to support their use.

Cardiac MRI – Aortic Root and Proximal Ascending Aorta

- See **Thoracic Aortic Aneurysm (TAA) (PVD-6.2)** in the Peripheral Vascular Disease imaging guidelines.

Cardiac MRI – Duchenne Muscular Dystrophy (DMD)

Criteria

Cardiac MRI (CPT® 75557 or 75561-does not include CPT® 75565 or 71555 unless otherwise indicated)

- Asymptomatic individual with documented DMD can have annual surveillance cardiac MRI starting at 6 years old (yearly echo is recommended prior to age 6)
- Asymptomatic, documented carrier of DMD can have cardiac MRI every 3 years starting at 18 years

Cardiac MRI – Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade

Criteria

- Contrast-enhanced cardiac MRI (CPT® 75561) is useful for evaluating pericarditis, neoplastic, and other effusion, tamponade, or myocardial infiltration if a specific clinical question is left unanswered by echocardiogram or another recent imaging study.

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Cardiac MRI – Myocarditis

Clinical evaluation of suspected myocarditis

Initial testing for suspected myocarditis should consist of an electrocardiogram, measurement of cardiac troponin, and an echocardiogram.

Criteria

Cardiac MRI (CPT® 75561) is considered medically necessary for suspected myocarditis in the presence of **all** of the following:

- New onset or persisting symptoms suggestive of myocarditis documented by **any** of the following:
  - dyspnea
  - chest pain
  - palpitations
  - syncope
  - effort intolerance
- Evidence for recent or ongoing myocardial injury documented by **any** of the following results on initial screening:
  - ventricular dysfunction noted on any cardiac imaging study, or
  - new or persisting ECG abnormalities suspicious for myocarditis
    - ST changes, T wave changes, Q waves, or
    - conduction abnormalities, such as LBBB or AV block, or
    - VT or VF
  - elevated troponin
- Strong suspicion for viral etiology of myocardial injury with documentation of **both**:
  - recent systemic viral disease, recent mRNA COVID-19 vaccination, or prior myocarditis
  - no evidence of coronary ischemia as documented by **any** of the following:
    - lack of risk factors for CAD
    - age < 35 years
    - negative cardiac imaging study, such as MPI, CCTA, catheterization

Return to Play Screening for athletes at risk for myocarditis

Criteria

Cardiac MRI (CPT® 75561) is considered medically necessary for **Return to Play Screening** for athletes when there is documentation of **both** of the following:

- Individual has a history of a clinical condition associated with myocarditis (i.e., COVID-19 infection or recent mRNA COVID-19 vaccination).

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- Initial screening has been performed with documentation of **either** of the following:
  - Initial screening (ECG, troponin, and TTE) showed evidence for recent or ongoing myocardial injury (as defined above in Clinical Evaluation of Suspected Myocarditis) with ongoing symptoms concerning for myocarditis (dyspnea, chest pain, palpitations, syncope, or effort intolerance).
  - Normal results of initial screening with persistent or new onset symptoms concerning for myocarditis.

Evidence Discussion

- Guidelines and appropriate use criteria support the use of transthoracic echocardiogram (TTE) as the initial study for a broad range of cardiac conditions. TTE can be used to evaluate cardiac morphology and function and provides information necessary to diagnose and guide treatment in conditions including heart failure and cardiomyopathy, ischemic heart disease, and valvular dysfunction. TTE is also used to initially assess intracardiac and extracardiac structures, including suspected cardiac masses, sources of emboli, and pericardial conditions. TEE visualizes portions of the great vessels and provides initial imaging of these structures.
- TTE has significant advantages over other imaging modalities; it is easily accessible and even portable, provides no exposure to radiation, is inexpensive, and has minimal, if any, risks.
- Like TTE, MRI assesses cardiac morphology and function; additionally, MRI provides information regarding myocardial perfusion, metabolism, and tissue composition.
- When questions remain unanswered after TTE, MRI can provide additional information due to its ability to assess myocardial composition and mass; these characteristics make cardiac MRI especially useful in the settings of cardiomyopathy, non-compaction, infiltrative heart disease, post cardiac transplant, cardiac masses, pericardial disease, and myocarditis.
- Beyond imaging with TTE, MRI can provide improved visualization of valvular pathology, because images are not limited by body habitus, is of high spatial resolution, can more accurately quantify the magnitude of valve insufficiency and stenosis, and can assess the effects of valve dysfunction on ventricular mass or volume. Qualities of MRI that augment evaluation of valvular disease may also improve visualization of intracardiac shunts over TTE alone.
- Advantages of MRI assessment of the great vessels include avoidance of ionizing radiation, provision of excellent spatial resolution of structures, and is not limited by body habitus.
- Conditions that are better evaluated initially by MRI, include coronary artery anomalies, and diseases of abnormal myocardial composition: Arrhythmogenic right ventricular dysplasia, Fabry disease-(Late enhancement MRI may predict the effect

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of enzyme replacement therapy on myocardial changes that occur with this disease), cardiac sarcoidosis, and Duchenne Muscular Dystrophy.
- When TTE and other less advanced imaging provide the information necessary to diagnose and treat cardiovascular conditions, MRI is not medically necessary.
- Disadvantages of MRI include being less accessible and possibly being incompatible for use in those with implanted devices. The gadolinium contrast agents used in MRI require precautions in those with advanced renal disease and severe liver disease.
- The decision to use MR imaging is made in the context of other testing; duplication of information should be avoided, and more readily available modalities with lower risk, initially considered. An assessment should be made as to whether additional testing will provide complementary diagnostic, therapeutic, or prognostic information that will optimize care.

Cardiac MRI – Coding

Cardiac Imaging Procedure Codes

Cardiac MRI	CPT®/HCPCS
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
C9762	Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with strain imaging

- Only 1 procedure code from the set (CPT® 75557-CPT® 75563) should be reported per session.
- Only 1 flow velocity measurement (CPT® +75565) should be reported per session when medically necessary.

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Cardiac Stress MRI - (CD-5.3)

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Other Reasons for Cardiac Stress MRI

Criteria

- If a nuclear perfusion (MPI) stress test was performed and was equivocal, a stress MRI is considered medically necessary.
- See **Stress Testing with Imaging – Criteria (CD-1.4)**. for other stress testing criteria

Not Medically Necessary

Quantification of segmental dysfunction

C9763-Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging. The use of stress CMR for the quantification of segmental dysfunction is considered investigational and experimental at this time.

Evidence Discussion

Stress cardiovascular magnetic resonance (CMR) provides high-resolution perfusion imaging with concurrent assessment of ventricular function, ischemia, and tissue characterization (e.g., edema and scar), allowing further evaluation when other stress modalities are nondiagnostic or confounded by attenuation artifacts (Hundley et al., 2010; Li et al., 2023).

Contemporary multimodality Appropriate Use Criteria and the 2024 ESC chronic coronary syndromes guideline position stress CMR as appropriate across multiple stable chest pain scenarios and specifically as a follow-up option after inconclusive prior testing (Winchester et al., 2023; Vrints et al., 2024).

When prior SPECT MPI results are equivocal or discordant with symptoms, stress CMR improves diagnostic confidence and clinical decision-making because its higher spatial resolution and freedom from soft tissue attenuation support more accurate detection of ischemia and better risk reclassification (Winchester et al., 2023; Vrints et al., 2024).

Quantification of segmental dysfunction by stress CMR (C9763) is investigational consistent with AUC and guideline standards pending further evidence of clinical utility (Winchester et al., 2023; Vrints et al., 2024).

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Cardiac Stress MRI – Coding

Cardiac Imaging Procedure Codes

Code	Description
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
C9763	Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging
+0899T	Noninvasive determination of absolute quantitation of myocardial blood flow (AQMBF), derived from augmentative algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)
+0900T	Noninvasive estimate of absolute quantitation of myocardial blood flow (AQMBF), derived from assistive algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)

- Only 1 procedure code from the set (CPT® 75557- CPT® 75563) should be reported per session.
- Only 1 flow velocity measurement (CPT® +75565) should be reported per session when medically necessary.
- C9763-Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging. The use of stress CMR for the quantification of segmental dysfunction is considered investigational and experimental at this time.

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Cardiac PET

Guideline

Cardiac PET/PET CT Perfusion (CD-6.2)
Cardiac PET Metabolic (CD-6.4)
FDG PET/CT for Suspected or Known Infections (CD-6.5)
Cardiac PET – Coding
References (CD-6)

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Cardiac PET/PET CT Perfusion (CD-6.2)

CD.PET.0006.2.A
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Criteria

CPT® 78430, CPT® 78431, CPT® 78491 and CPT® 78492

- Cardiac PET is considered medically necessary when requested after an equivocal nuclear perfusion (SPECT MPI) stress test.
- Routine use in post heart transplant assessment of transplant CAD

See also **Stress Testing with Imaging (CD-1.4)** for stress imaging indications

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Cardiac PET Metabolic (CD-6.4)

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Criteria

CPT® 78429 or CPT® 78459 and CPT® 78451; or

CPT® 78432; or

CPT® 78433

Cardiac PET Metabolic and cardiac SPECT or cardiac PET perfusion is considered medically necessary as follows:

- to determine myocardial viability when a previous study has shown significant left ventricular dysfunction and revascularization is under consideration
- to diagnose strongly suspected cardiac sarcoid **or** monitor response to therapy for established cardiac sarcoid. See **Cardiac Sarcoidosis (CD-3.9)**.

Evidence Discussion

Metabolic FDG PET, often combined with perfusion imaging, informs viability assessment in patients with significant LV dysfunction being considered for revascularization and supports diagnostic clarification and therapeutic monitoring in suspected or established cardiac sarcoidosis (Murthy et al., 2018; Youssef et al., 2012).

For cardiac sarcoidosis, FDG PET detects active inflammation and adds prognostic information beyond perfusion or CMR alone. integration into care has been associated with improved risk stratification and response assessment to immunosuppression (Blankstein et al., 2014; Youssef et al., 2012).

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FDG PET/CT for Suspected or Known Infections (CD-6.5)

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Criteria

CPT® 78815 or CPT® 78429

FDG PET/CT is considered medically necessary to evaluate suspected or known infections as follows:

- to assess suspected prosthetic heart valve endocarditis when there is documentation of **both** of the following:
  - TTE and/or TEE are equivocal or non-diagnostic
  - Suspicion for prosthetic heart valve endocarditis remains high (all):
    - C-reactive protein ≥40mg/L
    - no evidence of prolonged antibiotic therapy
    - the implantation was ≥3 months ago and there is no evidence of surgical adhesives used during the valve implantation
- to assess suspected cardiac implantable electronic device (CIED) or other intracardiac prosthetic device infections
- to evaluate any ventricular assist device (e.g., RVAD, LVAD, BiVAD) driveline infection

Evidence Discussion

Cardiovascular implantable electronic device (CIED) infection

CIED infection carries substantial mortality, and accurate localization determines whether complete hardware extraction is required. Conventional evaluation is limited: transesophageal echocardiography cannot reliably distinguish infective vegetations from non-infective lead echodensities such as thrombus or fibrin, which are common and may prompt unnecessary extraction, while echocardiography is insensitive to pocket and generator involvement (Dilsizianet al., 2022; Baddouret al., 2024).

[^{18}F]FDG PET/CT addresses this gap by imaging metabolically active inflammatory cells. Pooled analyses across CIED infection studies report sensitivity of approximately 87% and specificity of approximately 94%.(Dilsizianet al., 2022).Performance is not uniform across compartments: accuracy is consistently higher for pocket and generator infection than for intravascular lead infection, where sensitivity falls and a negative study cannot exclude disease. The modality therefore has high positive but comparatively lower negative predictive value for lead

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involvement (Bourque et al., 2024).When FDG uptake is incorporated as a major criterion, diagnostic sensitivity of the Duke framework rises from roughly 52%–70% to 91%–97%, with the same reclassification benefit demonstrated for lead-related endocarditis (Dilsizianet al., 2022).

For non-CIED intracardiac prosthetic material annuloplasty rings, closure devices, patches, and conduits consensus supports PET/CT in persistent bacteremia with negative echocardiography and CT, where a negative scan effectively excludes prosthetic material infection and a positive scan localizes the source and identifies extracardiac seeding (Bourque et al., 2024).In durable ventricular assist devices, pooled sensitivity exceeds 90% with heterogeneous specificity, favoring an exclusionary role while distinguishing driveline from pump or cannula involvement (Tam et al., 2020).

Diagnostic yield is technique dependent. Sensitivity declines with prolonged antecedent antibiotic therapy and in low-grade infection, so imaging should be obtained early. Adequate myocardial glucose suppression, persistence of uptake on non-attenuation-corrected images to exclude metal artifact, late acquisition when blood-pool activity is high, and interpretation by experienced readers are each required for valid results. Surgical bioadhesives generate false positives (Bourque et al., 2024).

The 2024 AHA statement designates FDG PET/CT the preferred advanced imaging modality over radiolabeled leukocyte SPECT/CT, while noting that no prospective head-to-head trials exist and that imaging must never delay indicated extraction (Baddouret al., 2024; Bourque et al., 2024).

Suspected or Known Prosthetic Valve Endocarditis

Prosthetic valve endocarditis (PVE) is difficult to diagnose because echocardiography performs poorly around prosthetic material: transthoracic sensitivity is 40% to 50%, and transesophageal sensitivity for abscess or pseudoaneurysm falls to approximately 40% (Cuervo et al., 2024).

An individual-patient-data meta-analysis (537 patients, 17 studies) reported sensitivity 85% (95% CI 74.2%-91.8%) and specificity 86.5% (95% CI 75.8%-92.9%); single-center prosthetic-material series reported 93% sensitivity, 90% specificity, and 94% negative predictive value (de Camargo et al., 2020; O'Gorman et al., 2023). The principal value is diagnostic reclassification. Abnormal cardiac uptake as a major criterion reclassified 76% of initially "possible" cases to "definite," and 84% of "possible PVE" patients reached a conclusive diagnosis after imaging; overall Duke sensitivity rises from 52%-70% to 91%-97% (Cuervo et al., 2024; de Camargo et al., 2020; O'Gorman et al., 2023; Otto et al., 2021). The 2023 Duke-ISCVID criteria accordingly adopted PET/CT as a major criterion for prosthetic valve uptake and a minor criterion for extracardiac uptake (Fowler et al., 2023).

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Performance is valve-type dependent: 93% sensitivity in PVE versus 22% in native valve endocarditis (NPV 66%), so a negative study cannot exclude native valve infection (de Camargo et al., 2020). Accuracy is confounder-sensitive: visual assessment yielded 74%/91% sensitivity/specificity, improving to 91%/95% after excluding CRP ≥40 mg/L and surgical adhesives; recent implantation was not a confounder, and an EARL-standardized SUV ratio ≥2.0 was 100% sensitive and 91% specific (Swart et al., 2018). Imaging should occur early, since prolonged antibiotics suppress inflammatory activity; adequate myocardial glucose suppression and experienced interpretation are required (Bourque et al., 2024b; Otto et al., 2021; Philip et al., 2020; Swart et al., 2018). Multisociety consensus rates PET/CT Appropriate when echocardiography is negative or equivocal with persistent suspicion, and preferred over leukocyte SPECT/CT in fungal and certain gram-negative infections; cardiac CTA remains superior for perivalvular anatomy and surgical planning (Bourque et al., 2024b; Budde et al., 2025).

Consensus ratings are modified-Delphi appropriate-use designations, not graded recommendations. Confounder-adjusted accuracy required exclusion of 43% of a retrospective cohort. Subgroup signals for mechanical and transcatheter valves rest on small numbers, and deferral within 3 months of surgery remains contested (Bourque et al., 2024a; Cuervo et al., 2024; O'Gorman et al., 2023; Philip et al., 2020; Swart et al., 2018).

FDG PET/CT materially improves diagnostic certainty in PVE, chiefly by resolving "possible" cases. Outcome-linked prospective data remain the principal unmet need (Cuervo et al., 2024; Godefroy et al., 2023; O'Gorman et al., 2023).

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Cardiac PET – Coding

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Cardiac Imaging Procedure Codes

Cardiac PET	CPT®
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
+78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)
78459	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study;

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Cardiac PET	CPT®
78491	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic)
78492	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh

- 3D rendering should not be billed in conjunction with PET.
- Separate codes for such related services as treadmill testing (CPT® 93015-CPT® 93018) and radiopharmaceuticals should be assigned in addition to perfusion PET. These services are paid according to each individual payer.

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Diagnostic Heart Catheterization

Guideline

Diagnostic Heart Catheterization (CD-7.3)
Right Heart Catheterization and Right and Left Heart Catheterization without Coronary Angiography (CD-7.4)
Combined Right and Left Heart Catheterization Indications (CD-7.5)
Planned (Staged) Coronary Interventions or Invasive Coronary Function Testing (CD-7.6)
Evaluation of Conditions Other than Coronary Artery Disease (CD-7.7)
Diagnostic Heart Catheterization – Coding Notes (CD-7.2)
References (CD-7)

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LHC – Unstable/Active Coronary Artery Syndromes (CD-7.3.1)

Criteria

CPT® 93454, 93455, 93458, 93459

The listed diagnostic heart catheterization codes are considered medically necessary for individuals with Acute Coronary Syndromes including unstable angina, NSTEMI and STEMI and should be handled as medical emergencies.

- Diagnostic left heart catheterization is considered medically necessary for new onset, accelerating, or worsening ischemic symptoms suggestive of acute coronary syndrome (ACS) occurring at rest, or with minimal exertion resolving with rest, including:
  - cardiac chest pain (typical angina) with or without new onset, evolving ischemic EKG changes
  - symptoms consistent with the known angina pattern in an individual with a history of CABG or PCI
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

Stable Established CAD Post Revascularization with CABG or PCI (CD-7.3.2)

Criteria

CPT® 93454, 93455, 93458, 93459

Note: These guidelines apply to individuals with stable conditions and who are not in the acute setting (acute coronary syndrome or unstable angina).

- Diagnostic left heart catheterization is medically necessary in individuals with established Coronary Artery Disease (CAD) post revascularization by percutaneous

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coronary intervention (PCI) or coronary artery bypass graft surgery (CABG) when there is documentation of **one** of the following:
  - new, recurrent, or worsening ischemic symptoms similar to prior ischemic episode
  - new, recurrent, or worsening cardiac chest pain as defined in **General Guidelines (CD-1.0)**
  - new, recurrent, or worsening symptoms of chest pain, exertional dyspnea, or exertional fatigue AND intermediate or high-risk findings on non-invasive stress testing as documented by one of the following:
    - cardiac chest pain induced by exercise treadmill testing or dobutamine stress testing
    - exercise treadmill testing inducing any of the following:
      - at least 1mm horizontal or downsloping ST-depression
      - at least 1mm ST-elevation in two leads
      - ventricular tachycardia of at least 3 consecutive beats
    - myocardial perfusion imaging (SPECT or PET) with ≥5% reversible ischemic burden
    - stress echo with at least 2 segments of inducible ischemia
    - severe stress induced left ventricular dysfunction (drop in left ventricular ejection fraction with stress ≥10%)
  - new left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
  - worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
  - new or worsened heart failure
  - ventricular fibrillation
  - sustained ventricular tachycardia
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

Stable Symptomatic Suspected or Established Coronary Artery Disease (CD-7.3.3)

Criteria

CPT® 93454, 93455, 93458, 93459

For the purpose of this guideline, cardiac chest pain is defined in **General Guidelines (CD-1.0)**.

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- Diagnostic left heart catheterization with coronary arteriography (CPT® 93454, 93455, 93458, or 93459) is medically necessary when there is documentation of one of the following:
  - New onset, persistent, or worsening of cardiac chest pain symptoms and either:
    - Symptomatic failure of a 12 week trial of OMT including as tolerated all of the following:
      - anti-platelet therapy
      - statin and/or other lipid-lowering therapy
      - anti-anginal therapy implemented to pursue a goal heart rate of 60 beats per minute or less
      - anti-hypertensive therapy as may be indicated to pursue a goal systolic blood pressure (SBP) of <140mmHg and a goal diastolic blood pressure (DBP) of <90mmHg
    - Worsening of cardiac chest pain symptoms during 12 week trial of OMT
    - inconclusive stress imaging
  - New onset, persistent, or worsening of cardiac chest pain symptoms and documentation of **one** of the following:
    - Established CAD per **General Guidelines (CD-1.0)**or age ≥50 years and/or ≥2 CAD risk factors: diabetes mellitus, tobacco smoker, family history of premature CAD in a first-degree relative (biologic parent, sibling, or child), hypertension, dyslipidemia, hx of APOs
    - Cardiac chest pain at a low level of exercise or at rest despite optimal medical therapy
  - Diagnostic left heart catheterization is considered medically necessary irrespective of OMT for symptomatic (chest pain or dyspnea on exertion or exertional fatigue) individuals who also have high-risk findings on Coronary CT Angiography see **Coronary CT Angiography (CCTA) Criteria (CD-4.3)** to include any of the following:
    - left main coronary artery stenosis ≥40%
    - proximal or mid left anterior descending coronary artery stenosis ≥70%
    - proximal or mid double-vessel major epicardial coronary artery stenosis ≥60%
    - proximal or mid triple-vessel major epicardial coronary artery stenosis ≥50%
    - CT-FFR measured to be ≤0.8 in the proximal or mid segment of any coronary artery or major epicardial branch irrespective of degree of stenosis
  - Diagnostic left heart catheterization is considered medically necessary irrespective of OMT for symptomatic (chest pain or dyspnea on exertion or exertional fatigue) individuals who have high-risk findings on non-invasive stress testing including any of the following:
    - cardiac chest pain induced by exercise treadmill testing or dobutamine stress testing

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        - myocardial perfusion imaging with at least 10% reversible ischemic burden
        - stress echo with 2 or more segments of inducible ischemia
        - exercise treadmill testing inducing at least 2.5 mm downsloping ST-depression or 3mm horizontal ST-depression in two leads
        - ventricular tachycardia of at least 3 consecutive beats induced by an exercise treadmill test
        - Stress CMR with **either** of the following findings:
            - 4 or more of 32 subsegments with ischemic perfusion defects during vasodilation stress
            - 3 or more of 16 segments with new or worsened dysfunction during exercise stages or progressive inotropic stress
    - Diagnostic left heart catheterization is considered medically necessary if coronary artery disease is the suspected etiology for **any** of the following findings:
        - new or worsened heart failure
        - new left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
        - worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
        - ventricular fibrillation or sustained ventricular tachycardia
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
    - The major component of the individual's symptoms is dyspnea
    - Newly diagnosed or worsening cardiomyopathy

Not Medically Necessary

Diagnostic left heart catheterization to screen for coronary artery disease (CAD) in asymptomatic individuals who are not anticipating other cardiac procedures is not considered medically necessary.

Background and Supporting Information

In addition to OMT, physician-guided behavioral modification therapy (BMT) is medically necessary including all of the following:

- Mediterranean diet
- Moderate intensity physical activity for at least thirty minutes per day at least five times per week as possible
- Attempts at smoking cessation to include at least one of the following:
    - Cognitive behavioral therapy
    - Nicotine withdrawal replacement therapy

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Inconclusive stress imaging
- for stress echo
  - 3 or more dysfunctional segments of the 16 segments during stress
- for stress CMR
  - 4 or more 32 subsegments with ischemic perfusion defects during vasodilation stress OR
  - 3 of 16 segments with new or worsened dysfunction during exercise stages or progressive inotropic stress

Exclusion of Significant Coronary Artery Disease Involvement in Other Cardiac Pathology (CD-7.3.4)

Criteria

CPT® 93454, 93455, 93458, 93459

- Diagnostic left heart catheterization is medically necessary when the etiology is unclear for **any** of the following conditions when coronary artery disease is suspected:
  - new or worsened heart failure
  - new left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
  - worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
  - ventricular fibrillation or sustained ventricular tachycardia
  - unheralded syncope (not near syncope)
  - suspected myocarditis
  - CCTA findings with high risk findings such as:
    - left main disease with ≥50% stenosis
    - three-vessel disease with ≥70 stenosis
    - two-vessel disease with ≥70% stenosis, including the proximal LAD
    - one-vessel disease of the proximal LAD with ≥70% stenosis and FFR-CT ≤0.8
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

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Evaluation of Structural Heart Disease (CD-7.3.5)

Criteria

CPT® 93454, 93455, 93458, 93459

Diagnostic left heart catheterization with coronary arteriography is medically necessary for any of the following:

- Evaluation prior to planned invasive procedure or surgery
  - Ruling out coronary artery disease prior to planned non-coronary cardiac or great vessel surgery including any of the following:
    - cardiac valve surgery
    - surgical myectomy for hypertrophic cardiomyopathy
    - aortic dissection
    - aortic aneurysm
    - congenital disease repair such as atrial septal defect
  - Pre-organ transplant (non-cardiac)-in place of stress imaging for initial pre-transplant evaluation (per the transplant center's protocol) **or** if stress imaging is positive for ischemia. Repeat periodic screening while on a transplant waiting list (in the absence of other clinical indications) is not medically necessary. See **Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)**.
  - Prior to catheter ablation of ventricular arrhythmia at one of the following sites:
    - sinus of Valsalva
    - coronary venous system
    - epicardium
- Valvular heart disease when either:
  - There is a discrepancy between the clinical findings (history, physical exam, and non-invasive test results).
  - Valvular surgery is being considered.
- Suspected pericardial disease
- Previous cardiac transplant:
  - per transplant center protocol
  - to assess for accelerated coronary artery disease associated with cardiac transplantation

Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:

- The major component of the individual's symptoms is dyspnea
- Newly diagnosed or worsening cardiomyopathy

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Evidence Discussion

Medical specialty organization guidelines recommend guideline directed medical therapy as the cornerstone of management of chronic coronary artery disease. These recommendations are based on a large body of evidence; including multiple large randomized controlled clinical trials (COURAGE, ISCHEMIA, and BARI-2D), and meta-analyses that demonstrate a significant improvement in angina symptoms, and cardiac events with guideline directed medical therapy. These trials further demonstrate that there is no improvement in survival or cardiac events with routine revascularization compared to guideline directed medical therapy.

Management options for coronary artery disease should account for the risks of invasive coronary angiography weighed against the benefits. Invasive coronary angiography is associated with cardiac (e.g., coronary artery injury and myocardial infarction) and extra-cardiac (e.g., vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury) risks. Invasive coronary angiography should be utilized as the treatment option when there is a favorable benefit-to-risk assessment.

Based on medical specialty organization guidelines and Appropriate Use Criteria, indications for invasive coronary angiography include the following:

- angina despite guideline directed medical therapy
- angina with high-risk findings on stress testing
- new left ventricular systolic dysfunction or heart failure of suspected ischemic etiology
- known coronary artery disease with prior revascularization with recurrent angina
- prior to non-coronary cardiac surgery, major vascular surgery, or organ transplant

  In addition to OMT, physician-guided behavioral modification therapy (BMT) is recommended including all of the following:
  - Mediterranean diet
  - Moderate intensity physical activity for at least thirty minutes per day at least five times per week as possible
  - Attempts at smoking cessation to include at least either cognitive behavioral therapy or nicotine withdrawal replacement therapy

Angiography-Derived Fractional Flow Reserve (CD-7.3.6)

Criteria

Angiography-Derived Fractional Flow Reserve based on three-dimensional reconstruction of angiographic images is considered to be experimental, investigational, or unproven.

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Coding

Code	Description
C7557	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed and intraprocedural coronary fractional flow reserve (FFR) with 3D functional mapping of color-coded FFR values for the coronary tree, derived from coronary angiogram data, for real-time review and interpretation of possible atherosclerotic stenosis(es) intervention

Background and Supporting Information

Fractional flow reserve (FFR) is an index of the physiological significance of a coronary artery stenosis. It is derived by using a coronary artery pressure guidewire to measure the distal coronary artery pressure. Angiography-Derived Fractional Flow Reserve is an alternative approach to derive FFR without the use of a coronary artery pressure guidewire, based on 3D reconstruction of angiographic images. Mathematical modeling based on hemodynamic laws is then applied to the 3D reconstruction to derive the pressure dynamics along the coronary artery, with results displayed in a color-coded map. Further research is needed to evaluate the accuracy and applicability of Angiography-Derived Fractional Flow Reserve.

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Right Heart Catheterization and Right and Left Heart Catheterization without Coronary Angiography (CD-7.4)

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Criteria

- Diagnostic right heart catheterization (CPT® 93451) OR diagnostic right and left heart catheterization without coronary angiography (CPT® 93453) is medically necessary when results will impact the diagnosis and management of **any** of the following:
  - atrial septal defect (ASD) including shunt detection and quantification
  - ventricular septal defect (VSD) including shunt detection and quantification
  - patent foramen ovale (PFO)
  - anomalous pulmonary venous return
  - congenital defects including persistent left vena cava
  - pulmonary hypertension
  - pericardial diseases
  - valvular disease
  - right heart failure
  - left heart failure
  - newly diagnosed or worsening cardiomyopathy
  - preoperative evaluation for valve surgery
  - during a left heart catheterization where the etiology of the symptoms remains unclear
  - pre-lung transplant to assess pulmonary pressures
  - pre-liver transplant to assess pulmonary pressures
  - uncertain intravascular volume status with an unclear etiology
  - prior to LVAD implant and post LVAD implant as needed for hemodynamic assessment to guide changes to therapy
  - assessment post-cardiac transplant
    - for routine endomyocardial biopsy
    - assess for rejection
    - assess pulmonary artery pressure
    - can be done per the institution protocol or anytime organ rejection is suspected and biopsy is needed for assessment
  - evaluation of right ventricular morphology.

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- suspected arrhythmogenic right ventricular dysplasia.

Evidence Discussion

General information RHC (CPT® 93451)

- It is performed most commonly from the femoral vein, less often through the subclavian, brachial, or internal jugular vein and inter-atrial septal puncture approach.
- It includes a full oximetry for detection and quantification of shunts.
- Cardiac outputs are calculated by several techniques including the Fick thermodilution.
- Diagnostic right heart catheterization or right and left heart catheterization is performed for functional hemodynamic evaluation and may be combined with cardiac angiography for structural cardiac imaging and coronary angiography for anatomical evaluation of the coronary arteries. Diagnostic right heart catheterization or right and left heart catheterization is medically necessary in selected situations to obtain specific clinical information required for management decisions if it was not provided by non-invasive evaluation. This may be medically necessary in selected situations for management of valvular heart disease, myocardial disease, pericardial disease, congenital heart disease, pulmonary hypertension, heart failure, and post-cardiac transplantation. These indications are addressed in established evidence-based medical specialty organization guidelines pertaining to these conditions. If the clinical information required for management decisions was already provided by non-invasive evaluation, diagnostic heart catheterization does not add to management and, moreover, carries cardiac and extra-cardiac risks including coronary artery injury, myocardial infarction, vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury.

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Combined Right and Left Heart Catheterization Indications (CD-7.5)

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Criteria

Combined right and left heart catheterization (CPT® 93460 or 93461) is considered medically necessary for pre-operative surgical planning for any of the following procedures:

- heart valve surgery
- congenital heart defect repair
- lung transplant
- liver transplant

Background and Supporting Information

- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

Note:

See the individual diagnostic heart catheterization sections for more information.

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Planned (Staged) Coronary Interventions or Invasive Coronary Function Testing (CD-7.6)

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Criteria

Planned (Staged) Coronary Interventions

A repeat diagnostic left heart catheterization is considered not medically necessary when the individual is undergoing a planned staged percutaneous coronary intervention

Invasive Physiologic Evaluation

CPT® 93454 Coronary angiography

Coronary angiography is considered medically necessary for symptomatic individuals with persistent chest pain and CAD when requested as part of invasive coronary physiologic testing to guide treatment.

Evidence Discussion

Diagnostic cardiac catheterization with coronary angiography is performed prior to an interventional percutaneous coronary intervention (PCI) procedure. PCI may be performed on the same day as the diagnostic coronary angiogram (ad-hoc PCI) or on a later day (planned staged PCI). Diagnostic coronary angiogram is required only once prior to the interventional procedure. A repeat diagnostic coronary angiogram is not medically necessary prior to a planned staged percutaneous coronary intervention. A repeat diagnostic coronary angiogram does not add to the findings of the initial diagnostic coronary angiogram and, moreover, carries cardiac and extra-cardiac risks including coronary artery injury and myocardial infarction, vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury.

Planned (Staged) Coronary Interventions applies to individuals with clinically stable symptoms if there is documentation of a recent diagnostic catheterization finding of a significant lesion that was not intervened as part of the initial procedure and the documentation explicitly states that a subsequent procedure will be performed for planned/staged PCI of that lesion.

The 2021 AHA/ACC Chest Pain Guideline provides a Class IIa (B-NR) recommendation for invasive coronary function testing to improve the diagnosis of coronary microvascular

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dysfunction in individuals with known nonobstructive CAD, persistent stable chest pain who have at least mild myocardial ischemia on imaging (Gulati et al., 2021) The 2023 AHA/ACC Chronic Coronary Disease Guideline included a Class IIa (B-R) recommendation for stratified medical therapy guided by invasive coronary physiologic testing in symptomatic individuals with nonobstructive CAD based on the CorMicA trial (Virani et al., 2023).

Coding

Code	Description
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation

Note:

The CPT codes for percutaneous coronary interventions (PCI) include the following imaging services necessary for the procedure(s); contrast injection, angiography, 'road-mapping', and fluoroscopic guidance, vessel measurement angiography following coronary angioplasty, stent placement, and atherectomy. Separate codes for these services should not be assigned in addition to the PCI code(s) because the services are already included.

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Evaluation of Conditions Other than Coronary Artery Disease (CD-7.7)

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Criteria

- Combined right and left heart catheterization (CPT® 93453) is considered medically necessary for any of the following:
  - preoperative assessment prior to planned valvular surgery
  - evaluation of pulmonary hypertension out of proportion to or unexplained by the severity of valvular disease documented by other non-invasive imaging modalities (i.e., echo, CMR)
  - left ventricular dysfunction out of proportion to the severity of valvular disease documented by other non-invasive imaging modalities
  - suspected pericardial tamponade as documented by clinical findings or other non-invasive imaging modalities
  - suspected, or clinical uncertainty, between constrictive pericarditis versus restrictive cardiomyopathy physiology when there are questions left unanswered by other cardiac non-invasive imaging modalities
  - known or suspected cardiomyopathy with or without heart failure documented by prior advanced imaging
  - re-evaluation of known cardiomyopathy for any of the following:
    - change in clinical status
    - change in cardiac exam
    - when required to guide therapy
  - hypertrophic cardiomyopathy
  - subvalvular aortic stenosis
- Right and left heart catheterization (CPT® 93453) is medically necessary when there is uncertainty between clinical impression and other non-invasive imaging modalities to evaluate the following valvular diseases:
  - mitral stenosis
  - mitral regurgitation
  - aortic stenosis
  - aortic regurgitation
- Left heart catheterization (CPT® 93452) for hemodynamic evaluation of the left ventricle and aorta is medically necessary to evaluate aortic stenosis when there

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is uncertainty between the clinical impression and non-invasive imaging modality findings.

Evidence Discussion

Diagnostic right heart catheterization or right and left heart catheterization is performed for functional hemodynamic evaluation and may be combined with coronary angiography for structural cardiac imaging and coronary angiography for anatomical evaluation of the coronary arteries. Diagnostic right heart catheterization or right and left heart catheterization is medically necessary in selected situations to obtain specific clinical information required for management decisions if it was not provided by non-invasive evaluation. This may be medically necessary in selected situations for management of valvular heart disease, myocardial disease, pericardial disease, congenital heart disease, pulmonary hypertension, heart failure, and post-cardiac transplantation. These indications are addressed in established evidence-based medical specialty organization guidelines pertaining to these conditions. If the clinical information required for management decisions was already provided by non-invasive evaluation, diagnostic heart catheterization does not add to management and, moreover, carries cardiac and extra-cardiac risks including coronary artery injury, myocardial infarction, vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury.

Coding

Codes	Description
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed

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Diagnostic Heart Catheterization – Coding Notes (CD-7.2)

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- Diagnostic heart catheterization (CPT® 93451-CPT® 93461) includes all "road mapping" angiography necessary to place the catheters, including any injections and imaging supervision, interpretation, and report.
- Diagnostic heart catheterization (CPT® 93452-CPT® 93461) (for all conditions other than congenital heart disease) includes contrast injections, imaging supervision, interpretation, and report for imaging typically performed.
- Catheter placements in native coronaries or bypass grafts (CPT® 93454-CPT® 93461) include intraprocedural injections for bypass graft angiography, imaging supervision, and interpretation.
- Injection codes CPT® 93563-CPT® 93565 should not be used in conjunction with CPT® 93452-CPT® 93461.
- Codes CPT® 93451-CPT® 93461 do not include contrast injections and imaging supervision, interpretation, and report for imaging that is separately identified by the following specific procedure codes: CPT® 93566, CPT® 93567 and CPT® 93568.
- Separate diagnostic cardiac catheterization codes should only be assigned in conjunction with interventional procedures in the following circumstances:
  - No prior or recent diagnostic catheterization is available to guide therapy.
  - Individual's condition has significantly changed since the last diagnostic catheterization.
  - The treatment plan may be affected.
  - Other vessels may be identified for treatment.
  - Further establishment of a diagnosis from a non-invasive study is necessary.

Diagnostic Heart Catheterization – Coding

Cardiac Catheterization Procedure Codes

Codes	Description
93451-93464 93566-93568	Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve

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Codes	Description
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
with bypass grafts	
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
with RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
with RHC and bypass grafts	

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Codes	Description
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
with LHC	
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with LHC and bypass grafts	
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
with RHC and LHC	
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**

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Codes	Description
CPT® 93593 to 93597 are appropriate for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

- CPT® 93593 to 93597 are medically necessary for invasive evaluation of congenital heart disease. See specific conditions in **Adult Congenital Heart Disease.**

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Pulmonary Vascular Imaging

Guideline

Pulmonary Hypertension (PH) (CD-8.1)
References (CD-8)
Pulmonary Vein Imaging (CD-8.2)
References (CD-8)

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Pulmonary Hypertension (PH) (CD-8.1)

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Criteria

Screening

CPT® 93306

A screening echocardiogram (TTE) for PH is considered medically necessary in individuals with documented history of **any** of the following:

- pre-operative for planned liver transplant
- individuals evaluated for transjugular portosystemic shunt
- portal hypertension
- liver disease with signs and symptoms of PH
- bronchopulmonary dysplasia

Annual screening echocardiogram (TTE) is considered medically necessary in individuals with a documented history of any of the following:

- systemic sclerosis (SSc)
- individuals with PH mutations (e.g., BMPR2)
- first-degree relatives of individuals with PH
- connective tissue disorder with symptoms consistent with PH
- individuals with TR velocity ≥2.8m/s, with no other findings on additional testing
- individuals being treated with medications associated with PH
- individuals who have a concern documented for PH and had a negative echocardiogram but still show signs or symptoms of PH

Follow-up testing is not medically necessary in individuals with TR velocity <2.8m/s and no other signs, symptoms, or risk factors of PH.

Initial Imaging for PH

Transthoracic echocardiogram (TTE)

(CPT® 93306) is considered medically necessary when clinical evaluation indicates a concern for PH including **any** of the following findings:

- clinical notes document concern for pulmonary hypertension
- EKG findings concerning for PH such as **any** of the following:
  - right ventricular hypertrophy (RVH)

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  - right axis deviation
  - right atrial enlargement
- right ventricular hypertrophy or pulmonary artery dilation on other images
- history of pulmonary embolism with persistent or new onset DOE, or exercise limitation
- suspected PH in individuals with lung disease
- DOE with a history of connective tissue disorder, HIV, portal hypertension, or systemic sclerosis (SSc)
- symptoms of PH (**any** of the following):
  - breathlessness
  - SOB
  - decreased exercise tolerance
  - fatigue and rapid exhaustion
  - palpitations
  - dyspnea on bending forward
  - hemoptysis
  - exercise induced abdominal distention and nausea
  - weight gain due to fluid retention
  - syncope during or shortly after physical activity
  - exertional chest pain

Stress echo

(CPT® 93350 or 93351) is considered medically necessary to evaluate PH in the setting of **either** of the following conditions:

- concomitant valvular disease
- a documented concern for pulmonary hypertension

Cardiac MRI

(CPT® 75557) is considered medically necessary when TTE is equivocal or unclear (e.g., for RV function) .

Other advanced imaging

Any of the following imaging is considered medically necessary after TTE:

- High-resolution CT Chest (CPT® 71250) in the setting of hypoxemia to rule out restrictive lung disorders such as pulmonary fibrosis.
- CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) to evaluate for suspected acute or chronic pulmonary embolism.
- V/Q scan (CPT® 78580 or CPT® 78582) and SPECT imaging (CPT® 78803) or SPECT/CT imaging (CPT® 78830) to evaluate for any of the following:
  - suspected acute pulmonary embolism

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  - to evaluate for chronic thromboembolic pulmonary hypertension (CTEPH) at 3 to 6 months post pulmonary embolism if both of the following apply:
    - persistent or new onset DOE or exercise limitation
    - evidence of PH on TTE
  - to evaluate for CTEPH in individuals with PH of uncertain etiology
- TEE or CCTA or CMR to identify CHD to detect or exclude **any** of the following:
  - sinus venosus
  - atrial septal defects
  - patent ductus arteriosus
  - anomalous pulmonary venous connections

Indications for initial catheterization

CPT® 93451

Right heart catheterization (RHC) is medically necessary to evaluate known or suspected PH in the setting of **any** of the following:

- echocardiogram findings
  - TR velocity ≥3.4m/second
  - TR velocity ≥2.9m/second and presence of other PH signs on echo or other testing, or risk factors or associated indications
- individuals with SSc where breathlessness remains unexplained (RHC is recommended despite normal echocardiogram)
- individuals who have symptoms or concerns for PH with a negative or equivocal echocardiogram
- to determine if shunt closure is recommended due to congenital heart disease
- PH on echocardiogram
- prior to starting PH medical therapy
- Individuals with **low**-risk profile (based on an evidence based PAH Risk Score Calculator such as REVEAL 2.0, ESC/ERS & Compera 2.0) only need catheterization if medically necessary for another reason or equivocal studies.
- when left heart catheterization meets criteria for separate indication.
- preoperative for surgical intervention treating the cause of PH (MV, TV, AV, PV)
- Eisenmenger syndrome

Left heart catheterization (LHC) or Right and left heart catheterization as per the following guidelines:

- **Evaluation of Conditions Other than Coronary Artery Disease (CD-7.7)**
- **Diagnostic Heart Catheterization (CD-7.3)**

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Repeat Testing

CPT® 93306

Follow-up echocardiogram (TTE) on individuals with PH is considered medically necessary for any of the following:

- every 6 months for surveillance of stable individuals with moderate or severe pulmonary hypertension (pulmonary artery systolic pressure ≥50mmHg)
- 3 months after any change in PH therapy
- prior to planned intubation (e.g., for elective surgery)
- prior to planned pregnancy
- during pregnancy as often as requested by provider
- anytime, without regard for the number or timing of previous echo studies to evaluate change in clinical signs or symptoms

CPT® 75557

CMR may replace TTE for the above follow up imaging when future echocardiograms are expected to be non-diagnostic or inconclusive due to a persistent anatomic or physiologic condition.

Pulmonary embolism (PE)

TTE (CPT® 93306) is considered medically necessary 3 to 6 months post pulmonary embolism if **any** of the following apply:

- persistent or new onset dyspnea on exertion, or exercise limitation
- pulmonary hypertension or right ventricular dysfunction on initial echo at PE diagnosis
- history of recurrent pulmonary embolism

CPT® 93451

RHC is medically necessary for known PH as follows:

- at baseline
- then every 6 months
- anytime for clinical changes or with treatment changes

Evidence Discussion

Pulmonary hypertension (PH) is a complex, chronic disease with multiple etiologies that requires extensive evaluation, including ECG (right ventricular hypertrophy with/without strain, right atrial dilatation); chest x-ray; arterial blood gas, pulmonary function testing, CT angiography based on the etiology.

PH can be subdivided into the following 5 groups based on the underlying cause:

- Pulmonary arterial hypertension (PAH)

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- PH due to left heart disease
- PH due to lung disease
- Chronic thromboembolic PH (CTEPH)
- PH with unclear and/or multifactorial mechanisms

Probability of PH is assessed at initial evaluation:

- High probability:
  - TR velocity ≥3.4m/s
  - TR velocity between 2.9m/s to 3.4m/s and **one** of the following:
    - Right ventricle or pulmonary artery enlargement
    - Interventricular septum flattening
    - Right ventricular systolic dysfunction
- Intermediate probability:
  - TR velocity between 2.9m/s to 3.4m/s in the absence of other signs of PH
- Low probability:
  - TR velocity <2.8m/s

Peak TR velocity ≥2.8m/s may suggest PH; however, the presence or absence of PH cannot be reliably determined by TR velocity alone.

In addition to the tricuspid regurgitation velocity, other findings on echo can increase the probability of PH. Examples of these findings include:

- abnormal tricuspid annular plane systolic excursion (TAPSE)
- abnormal RV fractional area change (RV-FAC)
- abnormal RV free-wall strain
- abnormal tricuspid annulus velocity (S wave) derived from tissue Doppler imaging
- abnormal RV ejection fraction (RVEF) derived from 3D echocardiography

Pulmonary hypertension (PH) represents a heterogeneous group of disorders, including pulmonary arterial hypertension, PH due to left heart disease, PH due to lung disease or hypoxemia, chronic thromboembolic PH, and PH with multifactorial or unclear mechanisms. Professional society guidelines support transthoracic echocardiography (TTE) as the initial noninvasive test when PH is suspected based on symptoms such as dyspnea, fatigue, exertional chest pain, palpitations, syncope, abnormal ECG findings, right ventricular hypertrophy, pulmonary artery dilation, persistent dyspnea after pulmonary embolism, or risk factors such as connective tissue disease, systemic sclerosis, liver disease, HIV, lung disease, PH-associated medications, or pathogenic PH-related mutations (Humbert et al., 2022; Simonneau et al., 2013; Khanna et al., 2013). TTE provides noninvasive estimation of PH probability through tricuspid regurgitation velocity, right-sided chamber enlargement, septal flattening, right ventricular dysfunction, and pulmonary artery abnormalities, although echocardiographic estimates may be limited by image quality and do not replace invasive hemodynamic confirmation (Humbert et al., 2022).

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Current evidence supports a multimodality approach when TTE is equivocal, when PH etiology requires clarification, or when treatment decisions require more definitive assessment. Cardiac MRI is useful when echocardiography is unclear, particularly for right ventricular size and function, while CT or high-resolution CT can help evaluate lung parenchymal disease, pulmonary vascular abnormalities, or thromboembolic disease. Ventilation-perfusion imaging, including V/Q scan or SPECT/SPECT-CT, is recommended in the evaluation of suspected chronic thromboembolic pulmonary hypertension because it remains a sensitive screening test for chronic thromboembolic disease (Humbert et al., 2022; Remy-Jardin et al., 2021). Right heart catheterization remains the gold standard for diagnosis, classification, hemodynamic assessment, shunt assessment, and pre-treatment evaluation when PH-specific therapy or procedural management is being considered (Humbert et al., 2022).

Follow-up imaging is supported when results are expected to affect management, including surveillance of stable moderate or severe PH, assessment after PH therapy changes, evaluation before pregnancy or planned intubation, and evaluation of new or worsening symptoms. TTE every 6 months for stable moderate or severe PH and 3 months after a therapy change is consistent with the need to monitor right ventricular function and disease progression, although supporting evidence is largely guideline and consensus-based rather than derived from randomized imaging-frequency trials (Humbert et al., 2022; Faqih et al., 2016).

Coding

Code	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
78580	Pulmonary perfusion imaging (eg, particulate)
78582	Pulmonary ventilation (eg, aerosol or gas) and perfusion imaging
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (eg, head, neck, chest, pelvis) or acquisition, single day imaging

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Code	Description
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis) or acquisition, single day imaging
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed

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Pulmonary Vein Imaging (CD-8.2)

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Pulmonary Vein Isolation Procedure

Criteria

- MRI Cardiac (CPT® 75557 or 75561), or MRV Chest (CPT® 71555), or CTV Chest (CPT® 71275), or CT Cardiac (CPT® 75572) is considered medically necessary to evaluate the pulmonary veins as follows
  - prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure
  - post-procedure between 3-6 months after ablation
    - If no pulmonary vein stenosis is present, no further follow-up imaging is required.
    - If pulmonary vein stenosis is present on imaging following ablation and symptoms of pulmonary vein stenosis (usually shortness of breath) are present, imaging is considered medically necessary at 1, 3, 6, and 12 months.

Evidence Discussion

Pulmonary vein imaging is supported primarily for pre-procedural planning before atrial fibrillation ablation or pulmonary vein isolation and for evaluation of post-ablation pulmonary vein stenosis. CT cardiac imaging, CTV/CTA chest, cardiac MRI, and MRV/MRA chest provide detailed assessment of pulmonary venous anatomy, including ostial size, venous branching, number of pulmonary veins, anatomic variants, and relationship to the left atrium. CT is frequently used because of rapid acquisition, high spatial resolution, and 3-dimensional reconstruction capabilities, while MRI/MRA may be appropriate when radiation avoidance is preferred or CT contrast exposure is contraindicated (Hamdan et al., 2009; Korsholm et al., 2020). Echocardiography is less reliable for detailed pulmonary vein anatomy and is generally not the preferred modality for pre-ablation venous mapping.

Pulmonary vein stenosis is a recognized complication after atrial fibrillation ablation. Although uncommon, reported post-ablation stenosis may be asymptomatic or may present with dyspnea, hemoptysis, recurrent pulmonary edema, pulmonary hypertension, or unexplained respiratory symptoms. If stenosis is present and symptomatic, serial imaging at 1, 3, 6, and 12 months is medically reasonable to assess progression, stability, or response to intervention consistent with observational evidence

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indicating that most pulmonary vein stenoses remain stable over 1 year, while a smaller proportion progress (Hamdan et al., 2009; Korsholm et al., 2020).

Coding

Codes	Description
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)

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Heart Failure

Guideline

Heart Failure (CD-9)
References (CD-9)

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Heart Failure (CD-9)

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Criteria (CD-9.1)

- Heart failure (HF), including post-cardiac transplant failure:
  - Echocardiogram is the first study after the clinical evaluation for suspected HF.
  - MUGA, cardiac MRI, or cardiac CT may be medically necessary if the ECHO is limited or does not completely answer the question.
  - Stress test to assess for CAD may be medically necessary. Follow stress testing guideline: **Stress Testing with Imaging – Indications (CD-1.4).**
- Arteriovenous fistula with "high output" heart failure:
  - CT Chest with contrast (CPT® 71260) and/or CT Abdomen and/or CT Pelvis with contrast (CPT® 74160 or 72193 or 74177) **or**
  - CTA Chest (CPT® 71275) and/or CTA Abdomen and/or CTA Pelvis (CPT® 74175 or CPT® 72191 or CPT® 74174) **or**
  - MRI Chest and/or MRI Abdomen and/or MRI Pelvis without and with contrast (CPT® 71552 and/or 74183 and/or 72197) **or**
  - MRA Chest and/or MRA Abdomen and/or MRA Pelvis (CPT® 71555 and/or CPT® 74185 and/or CPT® 72198)
- Right-sided heart failure can be a manifestation of pulmonary hypertension or serious lung disease.
  - CT Chest (CPT® 71260) or CTA Chest (CPT® 71275) to evaluate for recurrent pulmonary embolism

Evidence Discussion

- Congestive heart failure is a complex clinical syndrome with signs and symptoms that are a result of structural and/or functional impairment of ventricular ejection or filling which results in objective evidence of pulmonary or systemic congestion.
- Identification of the etiology of the cardiac dysfunction is crucial in the diagnosis of heart failure (HF) to determine subsequent management.
- Evaluation of HF usually entails multiple different diagnostic tools incorporating tools such as echocardiogram, stress testing, genetic testing, nuclear imaging, CT/ MRI imaging, endomyocardial biopsy and cardiac catheterization.
- Treatment of HF is targeted towards treating the underlying cause, improving the function and structure of the heart, and reducing mortality and morbidity. This not only includes medications but may also entail the use of cardiac resynchronization

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devices, monitoring devices, ventricular assist devices, cardiothoracic surgery, and heart transplant.

Coding

Codes	Description
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72193	Computed tomography, pelvis; with contrast material(s)
72197	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s), followed by contrast material(s) and further sequences
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74160	Computed tomography, abdomen; with contrast material(s)
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
74183	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s), followed by with contrast material(s) and further sequences
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)

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Ventricular Assist Devices (CD-9.4)

Criteria

Ventricular assist devices (e.g., RVAD, LVAD, BiVAD) are implantable devices used in individuals with advanced heart failure refractory to medical therapy as a bridge to transplantation or as a destination therapy.

Pre-ventricular assist device implant criteria

The following imaging studies are medically necessary for preoperative evaluation prior to any planned ventricular assist device (e.g., RVAD, LVAD, BiVAD) implant:

- TTE (CPT® 93306)
- 3D rendering for echocardiography (CPT® 76376 or 76377)
- Cardiac MRI (CPT® 75557 or 75561) and CMR velocity flow mapping (CPT® 75565)
- CT Chest (CPT® 71250 or 71260) or CTA Chest (CPT® 71275) or MRI Chest (CPT® 71552) or MRA Chest (CPT® 71555)
- CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen and Pelvis (CPT® 74185 and 72198)
- CT Coronary Angiography (CPT® 75574) in individuals post-coronary artery bypass grafting to assess the location and course of the bypass grafts to guide the surgical approach
- Transesophageal echocardiography (CPT® 93312, 93320, 93325)
- Right heart catheterization (CPT® 93451) or Right and left heart catheterization (CPT® 93453)

Post ventricular assist device implant criteria

TTE (CPT® 93306) is medically necessary as follows:

- Post-implant at the following intervals:
  - 2 weeks
  - 1 month
  - 3 months
  - 6 months
  - 12 months
  - Every 6 months thereafter

CT

- CTA Chest (CPT® 71275) or CT Chest with contrast (CPT® 71260) is medically necessary for evaluation of ventricular assist device malfunction.

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- CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) is medically necessary for the evaluation of ventricular assist device -related infections.

FDG PET/CT for ventricular assist device driveline infection (CPT® 78815 orCPT® 78429)

- Early infection detection for ventricular assist device drivelines is desirable, since once the infection extends to the cannula and pump pocket, eradication becomes difficult. CT findings are nonspecific and metal device artifacts of the driveline itself affects sensitivity.
- FDG PET/CT is medically necessary for suspected LVAD infection if other studies and examination remain inconclusive.
- See **FDG PET/CT for Infections (CD-6.5)**.

Right heart catheterization (RHC)

- RHC (CPT® 93451) or Right and Left heart catheterization (CPT® 93453) as needed for hemodynamic assessment to guide changes to therapy.

Coding

Codes	Description
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences

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Codes	Description
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93312	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report

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Codes	Description
+93320	Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); complete
+93325	Doppler echocardiography color flow velocity mapping (List separately in addition to codes for echocardiography)
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed

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Cardiac Trauma

Guideline

Cardiac Trauma Imaging (CD-10.1)
References (CD-10)

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Cardiac Trauma Imaging (CD-10.1)

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Criteria

- One of the following can be used to evaluate cardiac or aortic trauma:
  - Echocardiogram (TTE, TEE)
  - Cardiac MRI Cardiac (CPT® 75557 or 75561, and 75565)
  - Cardiac CT Cardiac (CPT® 75572)
  - CCTA (CPT® 75574)
  - Chest CTA Chest (CPT® 71275)
  - Chest CT Chest (CPT® 71260, CPT 71270)

Evidence Discussion

Imaging in cardiac trauma is performed initially with transthoracic or transesophageal echocardiography for rapid hemodynamic assessment and pericardial evaluation. ECG-gated CT is also indicated when structural injury, great-vessel involvement, or complex anatomic clarification is needed. CMR is indicated in select subacute scenarios to characterize contusion, edema, or scar when management decisions depend on tissue diagnosis (Otto et al., 2021; Blanke et al., 2019; Hundley et al., 2010).

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Adult Congenital Heart Disease

Guideline

ASD-Atrial Septal Defects (CD-11.2.1)
Anomalous Pulmonary Venous Connections (CD-11.2.2)
Ventricular Septal Defect (VSD) (CD-11.2.3)
Atrioventricular Septal Defect (AV Canal, AVSD, Endocardial Cushion Defect) (CD-11.2.4)
Patent Ductus Arteriosus (PDA) (CD-11.2.5)
Cor Triatriatum (CD-11.2.6)
Congenital Mitral Stenosis (CD-11.2.7)
Subaortic Stenosis (SAS) (CD-11.2.8)
Congenital Valvular Aortic Stenosis (CD-11.2.9)
Aortic Disease in Turner Syndrome (CD-11.2.10)
Supravalvular Aortic Stenosis (CD-11.3.1)
Coarctation of the Aorta (CD-11.3.2)
Valvular Pulmonary Stenosis (CD-11.3.3)
Branch and Peripheral Pulmonary Stenosis (CD-11.3.4)
Double Chambered RV (CD-11.3.5)
Ebstein Anomaly (CD-11.3.6)
Tetralogy of Fallot (TOF, VSD with PS) (CD-11.3.7)
Right Ventricle-to-Pulmonary Artery Conduit (CD-11.3.8)
Transposition of the Great Arteries (TGA) (CD-11.3.9)
Congenitally Corrected TGA (CD-11.3.10)
Fontan Palliation of Single Ventricle Physiology (CD-11.3.11)
Severe Pulmonary Hypertension (PH) and Eisenmenger Syndrome (CD-11.3.12)
Coronary Artery Anomalies (CD-11.3.13)
Congenital Heart Disease Background and Supporting Information (CD-11.1)
References (CD-11)

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ASD-Atrial Septal Defects (CD-11.2.1)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CCT **or** CMR, and/or TEE are considered medically necessary when TTE is suboptimal as follows:
    - when ASD is suspected
    - to evaluate pulmonary venous connections in known ASD
    - to define the defect size, morphology, or rim anatomy
  - MRA Chest or CTA Chest are considered medically necessary for pulmonary venous anomalies on other imaging
    - If normal, repeat pulmonary vein imaging is not required.
- Diagnostic heart catheterization is considered medically necessary when there is either:
  - evidence of pulmonary hypertension
  - unanswered questions on CMR or CCT for venous drainage
- Stress imaging and coronary artery imaging is based on **Stress Testing with Imaging – Indications (CD-1.4)**.

Consideration of surgery

- Transesophageal echocardiogram (TEE) is recommended to guide percutaneous ASD closure.

Post-procedure imaging

- TTE is medically necessary post ASD device placement:
  - 1 week (if Amplatzer)
  - 1 month
  - 6 months (evaluate for erosion)
  - 12 months
  - then every 1-2 years
- Due to low-risk of erosion in PFO devices, PFO device closure requires follow-up at 6-12 months. No additional evaluation unless PFO not closed (see **Frequency of Echocardiography Testing (CD-2.3) PFO closure, TIPS, Cardiac device therapy, LVAD).**

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Surveillance imaging ASD surgically closed or without surgical interventions

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	A	B	C	D
TTE	36	12	12	12

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Anomalous Pulmonary Venous Connections (CD-11.2.2)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest at time of diagnosis if any issues with pulmonary veins or RV volume
  - Diagnostic heart catheterization at time of diagnosis for hemodynamic data and issues not answered on other imaging
- Routine stress imaging or coronary artery imaging not required
- TTE and either CCT **or** CMR for clinical changes
  - Diagnostic heart catheterization when other advanced imaging is inconclusive

Consideration of surgery

- TTE and either CCT **or** CMR
- Diagnostic heart catheterization when other advanced imaging is inconclusive

Imaging Post-repair

- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest for new cardiac symptoms

Surveillance imaging anomalous pulmonary venous connections

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	24	12	12

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Ventricular Septal Defect (VSD) (CD-11.2.3)

CD.CHD.0011.2.3.A
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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization at time of diagnosis if pulmonary hypertension (PH) or shunt size is a question

Consideration of surgery

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization if pulmonary hypertension (PH) or shunt size is a question

Surveillance imaging VSD

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	12	12	12

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Atrioventricular Septal Defect (AV Canal, AVSD, Endocardial Cushion Defect) (CD-11.2.4)

CD.CHD.0011.2.4.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern
- Stress imaging per Stress Testing with Imaging – Indications (CD-1.4)

Consideration of surgery

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern

Post repair

- Diagnostic heart catheterization when there is concern for LVOT obstruction

Surveillance imaging AVSD

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	24	12	12	12

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Patent Ductus Arteriosus (PDA) (CD-11.2.5)

CD.CHD.0011.2.5.A
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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - MRI Chest **or** MRA Chest **or** CT Chest **or** CTA Chest if TTE is suboptimal or equivocal
  - Diagnostic heart catheterization when other advanced imaging is inconclusive
- Stress imaging per **Stress Testing with Imaging – Indications (CD-1.4)**

Note:

if planned device closure, diagnostic cardiac catheterization is not medically necessary as it is included in the procedure code

Consideration of surgery

- TTE
- MRI Chest **or** MRA Chest **or** CT Chest **or** CTA Chest if TTE is suboptimal or equivocal

Surveillance imaging PDA

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	12	12	12

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Cor Triatriatum (CD-11.2.6)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest at baseline and with cardiac clinical changes
- Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern
- TEE at diagnosis to identify the size and location of the membrane orifice or when TTE is inconclusive or suboptimal

Consideration of surgery

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern

Surveillance imaging- Cor Triatriatum

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	36	12	12	12

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Congenital Mitral Stenosis (CD-11.2.7)

CD.CHD.0011.2.7.A
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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE

Consideration of surgery

- TTE

Surveillance imaging congenital mitral stenosis

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	24	12	12

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Subaortic Stenosis (SAS) (CD-11.2.8)

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Criteria

Imaging at baseline and for cardiac clinical changes

- Echocardiogram (TTE) (CPT® 93303 or 93304 or 93306 or 93308)
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)
  - once at the time of diagnosis
  - new or changed signs or symptoms of ischemia
  - changes in cardiac function
  - any signs or symptoms allowed in **Stress Testing with Imaging – Indications (CD-1.4)**

Consideration of surgery

- Echocardiogram (TTE) (CPT® 93303 or 93304 or 93306 or 93308)
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)

Surveillance imaging SAS

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	24	12	12
Stress imaging	N/A	24	24	12

Background and Supporting Information

This section relates to subaortic stenosis caused by a discrete membrane. For tunnel-like obstruction or hypertrophic cardiomyopathy, please refer to **Hypertrophic Cardiomyopathy (HCM) (CD-14)**.

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Congenital Valvular Aortic Stenosis (CD-11.2.9)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- TEE is medically necessary when TTE is limited or equivocal.
- MRA Chest or CTA Chest as follows:
  - there is suspicion of Coarctation of the aorta (COA) based on exam and echocardiogram; **or**
  - the proximal ascending aorta not well visualized on TTE; **or**
  - the degree of aortic dilatation is as follows:
    - 4.8cm or more in an individual with risk factors of family history of aortic dissection, aortic growth rate greater than or equal to 0.3cm/year, COA, or root-phenotype aortopathy; **or**
    - 5.3cm or more in an individual with none of the above listed risk factors

Consideration of surgery

- TTE
- TEE is medically necessary when TTE is limited or equivocal.

Surveillance imaging congenital valvular aortic stenosis

Modality	Physiological stage / intervals for routine imaging (months)			
Stage (valvular AS)	**Progressive (stage B) Mild Vmax 2.0-2.9 m/s**	**Progressive (stage B) Moderate Vmax 3.0-3.9 m/s**	**Severe (stage C) ≥4.0 m/s**	**Aortic root dilation >4.0cm**
TTE	36	12	6	12
MRA Chest or CTA Chest	N/A	N/A	N/A	12 (if ascending)

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Degree of aortic stenosis (AS) severity			
	Mild AS	**Moderate AS**	**Severe AS**
Vmax (m/s)[a] maximum Doppler velocity	2.0-2.9	3.0-3.9	≥4.0
Mean gradient (mmHg)[a]	<20	20-39	≥40
AVA (cm^2) aortic valve area	>1.5	1.0-1.5	<1.0
AVAi (cm^2/m^2 BSA) indexed aortic valve area	≥1.0	0.6-0.9	<0.6
[a]At normal transvalvular flow, BSA= body surface area			

Adapted from: 2025 ACC/AHA/HRS/ISACHD/SCAI Guideline for the Management of Adults With Congenital Heart Disease: A Report of the American College of Cardiology/ American Heart Association Joint Committee on Clinical Practice Guidelines (Gurvitz et al., 2026).

Background and Supporting Information

- degree of aortic dilatation is within 0.2cm of the interventional criteria (as follows):
  - 5.0cm when there are risk factors of risk family history of aortic dissection, aortic growth rate ≥0.3 cm/year, COA, or root-phenotype aortopathy
  - 5.5cm when there are no additional risk factors

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Aortic Disease in Turner Syndrome (CD-11.2.10)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- MRA Chest or CTA Chest if mid aorta was not seen on TTE

Consideration of surgery

- TTE
- MRA Chest or CTA Chest if mid aorta was not seen on TTE

Surveillance imaging aortic disease in Turner Syndrome

- Echocardiogram (TTE) yearly
  - MRA Chest or CTA if mid ascending aorta not visualized
- For documented thoracic aortic aneurysm (TAA) ≤4cm
  - Routine MRA Chest or CTA yearly
- For documented thoracic aortic aneurysm (TAA) >4cm
  - MRA Chest or CTA every 6 months.

Evidence Discussion

Dissection more common for a given aortic diameter. Mid-ascending aortic disease more common and my not be reliably seen on echocardiogram. A 25-year prospective study of 400 women with Turner syndrome published in 2023 evaluated predictors of aortic dissection. The investigators found that absolute ascending aortic diameter and Turner syndrome–specific z-scores predicted dissection better than ASI. The traditional ASI cutoff of 2.5 cm/m² had a sensitivity of only 17% for predicting dissection. An absolute ascending aortic diameter of 3.3 cm showed better predictive risk for dissection (Thunstrom et al., 2023).

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Supravalvular Aortic Stenosis (CD-11.3.1)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- MRA Chest or CTA Chest
- Diagnostic heart catheterization **or** CMR **or** CCTA to assess coronary ostia
- New cardiac symptoms-any of the following:
  - CCT **or** CMR
  - CTA Chest or MRA Chest
  - Stress imaging as per **Stress Testing with Imaging – Indications (CD-1.4)**

Consideration of surgery

- Diagnostic heart catheterization for any individuals pre-cardiac intervention for coronary arteries

Surveillance imaging- Supravalvular AS

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	24	12	12
CMR or CCT	36	36	36	36

Background and Supporting Information

Supravalvular aortic stenosis is a relatively rare condition overall but is seen commonly in individuals with Williams syndrome, homozygous familial hypercholesterolemia or nonsyndromic elastic arteropathy syndrome.

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Coarctation of the Aorta (CD-11.3.2)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - No further imaging is required if echocardiogram (TTE), blood pressure, and exam rule out Coarctation.
  - If echocardiogram and exam are equivocal or positive, one of the following is medically necessary:
    - CTA Chest
    - MRA Chest
  - Individuals with Coarctation of the aorta do not require intra-cardiac MRI unless issue cannot be resolved on echocardiogram.
  - Screening for intracranial aneurysm by MRA (CPT® 70544, 70545, 70546) or CTA (CTP® 70496) of head is medically necessary.
- ETT for diagnosis of exercise-induced hypertension does not require imaging.
- CMR not required unless issues unresolved by echo for intracardiac anatomy.
- Diagnostic catheterization is medically necessary prior to stenting of the coarctation.
- Stress imaging, TEE, CMR or CCT, Coronary imaging are not routine.

Symptomatic

- Individuals with Coarctation are at risk for dissection. When individual has new or worsening symptoms any of the following:
  - TTE
  - MRA Chest or CTA Chest
- For exertional symptoms, one of the following:
  - Stress imaging per **Stress Testing with Imaging – Indications (CD-1.4)**
  - CCT **or** CMR

Consideration of surgery

- TTE
- MRA Chest or CTA Chest if TTE is equivocal or positive
- Diagnostic heart catheterization is medically necessary prior to stenting of the coarctation.

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Surveillance Imaging Coarctation of the Aorta - Unrepaired

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	A	B	C	D
TTE	24	24	12	12
MRA Chest or CTA Chest	36	36	12	12

Surveillance Imaging Coarctation of the Aorta - Repaired

Modality	Intervals for routine imaging (years)	
MRA Chest or CTA Chest	Every 5 years	

Background and Supporting Information

Coarctation is suspected based on clinical findings:

- BP higher in upper extremities than in the lower extremities
- absent femoral pulses
- continuous murmur
- abdominal bruit
- berry aneurysm with hemorrhage
- rib notching on x-ray
- abnormal thoracic aortic imaging and blood pressure

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Valvular Pulmonary Stenosis (CD-11.3.3)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest when TTE is inconclusive or suboptimal

Consideration of surgery

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest when TTE is inconclusive or suboptimal

Surveillance imaging Valvular PS

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	36	24	12	12

Isolated Pulmonary regurgitation after PS repair-Echo and CMR at same interval as TOF

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	12	12	12
CMR	36	24	12	12

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Background and Supporting Information

- Echocardiogram-stages
  - Mild PS-peak gradient <36 mmHg (peak velocity <3m/s)
  - Moderate PS-peak gradient 36-64 mmHg (peak velocity 3-4 m/s)
  - Severe PS-peak gradient >64 mmHg (peak velocity >4m/s); or mean gradient >35mmHg.

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Branch and Peripheral Pulmonary Stenosis (CD-11.3.4)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- MRA Chest or CTA Chest
- CCT **or** CMR
- Diagnostic heart catheterization may be considered if other advanced imaging is not adequate for management.
- VQ scan or MRA Chest for differential blood flow

Consideration of surgery

- TTE
- MRA Chest or CTA Chest
- CCT **or** CMR
- Diagnostic heart catheterization is considered medically necessary when other advanced imaging does not provide necessary information for surgical management.

Surveillance imaging branch and peripheral pulmonary stenosis

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	24	12	12
CCT **or** CMR	36	36	24	24
MRA Chest or CTA Chest	36	36	24	24

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Background and Supporting Information

Risk factors include:

- surgeries of right ventricular outflow (TOF)
  - Noonan
  - Alagille
  - Williams
- maternal rubella exposure
- Keutel syndrome
- post-op arterial switch procedure-Lecompte maneuver

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Double Chambered RV (CD-11.3.5)

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Criteria

Imaging at baseline and for cardiac clinical changes
- TTE
- CCT **or** CMR when TTE is suboptimal or inconclusive

Consideration of surgery
- TTE
- Diagnostic heart catheterization when other advanced imaging is inconclusive
- CCT **or** CMR when TTE is suboptimal or inconclusive

Surveillance imaging double chambered right ventricle (RV)

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	24	24	12	6

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Ebstein Anomaly (CD-11.3.6)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE with 3D rendering (CPT® 93319) when requested
- TEE when TTE is inconclusive or suboptimal
- CCT **or** CMR

Consideration of surgery

- TEE
- CCT **or** CMR
- Diagnostic heart catheterization when other advanced imaging is inconclusive

Surveillance imaging Ebstein Anomaly

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	12	12	12	12
CCT **or** CMR	60	36	24	12

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Tetralogy of Fallot (TOF, VSD with PS) (CD-11.3.7)

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Criteria

Imaging at baseline and for cardiac clinical changes

Baseline

- TTE
- TEE including 2D, 3D, Doppler, and strain imaging as requested
- CCT/CCTA **or** CMR
- MRA Chest or CTA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive

New or worsening symptoms

- Repeat baseline advanced imaging
  - new or worsening symptoms
  - new EKG changes
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) allowed for typical chest pain, even if intermediate pretest probability at atypical symptoms in individuals with known or undefined coronary artery (CA) anatomy or CA pathology
- VQ scan or MRA Chest for left/right perfusion abnormality
- Diagnostic heart catheterization when pulmonary hypertension is a concern

Prior to cardiac intervention or surgery

- Repeat baseline imaging (TTE/MR/CT)
- Diagnostic heart catheterization prior to surgery or intervention
  - If planned Catheter Pulmonary Valve replacement, procedure includes diagnostic catheterization and hemodynamics, and diagnostic catheterization is not billed separately.

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Surveillance imaging Tetralogy of Fallot (TOF)

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	12	12	6
CCT/CCTA **or** CMR	36	24	12	6
CTA Chest or MRA	36	24	12	6

Background and Supporting Information

These guideline recommendations apply to individuals with Tetralogy of Fallot who have undergone a repair earlier in life and do not apply to individuals with **unrepaired** Tetralogy of Fallot

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Right Ventricle-to-Pulmonary Artery Conduit (CD-11.3.8)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) when there are cardiac symptoms

Consideration of surgery- Surgical repair for many lesions such as TOF/ Truncus / Pulmonary atresia

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive

Surveillance imaging Right Ventricle-to-Pulmonary Artery Conduit

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	12	12	12	12
CCT/CCTA **or** CMR	36	36	12	12
MRA Chest or CTA Chest	36	36	12	12

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Transposition of the Great Arteries (TGA) (CD-11.3.9)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

  In addition to repeat imaging with the above baseline studies, the following studies are medically necessary as follows:
  - Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) when there are cardiac symptoms
  - V/Q scan for left to right PA perfusion or MRA Chest
  - Diagnostic heart catheterization (right and left heart) when above advanced imaging does not explain clinical issues

Consideration of surgery

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Surveillance imaging TGA

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	12	12	12	12
CCT/CCTA **or** CMR	36	24	12	12

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Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
MRA Chest or CTA Chest	36	24	12	12

Arterial Switch

Imaging	Neoaortic diameter <5cm and unobstructed or mildly obstructed branch PAs	Neoaortic diameter ≥5 cm in any segment and/ or moderate or greater branch PA stenosis
CCT/CCTA **or** CMR	36	12

Background and Supporting Information

Includes s/p atrial switch, arterial switch, and Rastelli repair

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Congenitally Corrected TGA (CD-11.3.10)

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Criteria

Imaging at baseline and for cardiac clinical changes
- TTE (with speckle tracking CPT® 93356 as requested)
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Consideration of surgery
- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Surveillance imaging congenitally corrected TGA

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	12	12	12	12
CCT/CCTA **or** CMR	36	36	12	12
CTA Chest or MRA Chest	36	36	12	12

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Fontan Palliation of Single Ventricle Physiology (CD-11.3.11)

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Criteria

Including Tricuspid Atresia and Double Inlet Left Ventricle, HLHS, HRHS, PA, Mitral atresia, AVC unbalanced, single ventricle, DIRV, pulmonary atresia, HLHS, Glen procedure, TA, double outlet right ventricle (DORV), and single ventricle physiology

Imaging at baseline and for cardiac clinical changes

- TTE
- CCT/CCTA **or** CMR for issues that are equivocal on TTE
- Echocardiogram/CMR/CCT or CCTA/MRA Chest or CTA Chest/catheterization with any new signs or symptoms
- V/Q scan or MRA for lung perfusion left vs. right

Consideration of surgery

- Diagnostic heart catheterization prior to surgical interventions

Surveillance imaging Fontan Palliation of Single Ventricle Physiology

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	12	12	12	6
CCT/CCTA **or** CMR	36	24	24	24
CTA Chest or MRA	36	24	24	24
Diagnostic heart catheterization	120 (10 years)	120 (10 years)	120 (10 years)	120 (10 years)

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Severe Pulmonary Hypertension (PH) and Eisenmenger Syndrome (CD-11.3.12)

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Criteria

Imaging at baseline or for cardiac clinical changes

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
  - echocardiogram (TTE) results suggest PH
  - new signs or symptoms with PH
- Diagnostic heart catheterization when pulmonary hypertension is a concern

Consideration of surgery or for treatment planning

- TTE
- Diagnostic heart catheterization when other advanced imaging is inconclusive
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Surveillance imaging Severe Pulmonary artery hypertension (PH) and Eisenmenger syndrome

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	N/A	N/A	12	6
CCT/CCTA **or** CMR	N/A	N/A	As needed	As needed
MRA Chest or CTA Chest	N/A	N/A	As needed	As needed
Diagnostic heart catheterization	N/A	N/A	As needed	As needed

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Coronary Artery Anomalies (CD-11.3.13)

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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - at baseline
  - any signs or symptoms
- CCT/CCTA **or** CMR or Diagnostic heart catheterization for initial evaluation
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) for coronary artery from wrong sinus or for any cardiac signs or symptoms

Consideration of surgery

- TTE
- CCT/CCTA **or** CTA Chest **or** CMR **or** diagnostic heart catheterization

Surveillance imaging coronary artery anomalies

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	24	12	12

Background and Supporting Information

This section includes anomalous aortic origin of a coronary artery as well as anomalous coronary artery arising from the pulmonary artery.

For Kawasaki guideline regarding echo, Stress imaging, coronary imaging, see pediatric guideline Kawasaki Disease (PEDCD-6) in the Pediatric Cardiac Imaging Guidelines.

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Congenital Heart Disease Background and Supporting Information (CD-11.1)

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- For other associated disorders, please see the condition specific sections.
  - Marfan Syndrome
  - Hypertrophic cardiomyopathy (HCM)
  - Bicuspid aortic valve (BAV)

Definitions (CD-11.1.1)

Physiological stages (A, B, C, D)

Each congenital heart lesion is divided into 4 physiological stages (A, B, C, D).

Characteristics	Physiological stage			
	A	B	C	D
NYHA functional class	I	II	III	IV
Hemodynamic or anatomic sequelae	None	Mild ventricular enlargement of dysfunction, small shunt	Moderate or greater, ventricular dysfunction. Any venous or arterial stenosis	Moderate or greater, ventricular dysfunction. Any venous or arterial stenosis
Valvular	None	Mild	Moderate or greater	None
Aortic enlargement	None	Mild	Moderate	Severe

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Characteristics	Physiological stage			
	A	B	C	D
Exercise capacity limitation	Normal	Abnormal objective cardiac limitation	Moderate	Severe
Renal hepatic pulmonary dysfunction	None	None	Mild but responsive to medication	Refractory to treatment
Cyanosis/ hypoxemia	None	None	Mild	Severe
Arrhythmias	None	Arrhythmia not requiring treatment	Needs medical therapy	Refractory to medical therapy
Pulmonary hypertension	None	None	Mild to moderate	Severe or Eisenmenger

- CHD Anatomic classification
  - Class I-Simple
    - Native disease
      - isolated small ASD
      - isolated small VSD
      - mild isolated pulmonic stenosis
    - Repaired conditions
      - previously ligated or occluded ductus arteriosus
      - repaired secundum ASD or sinus venosus defect without significant residual shunt or chamber enlargement
      - repaired VSD without significant residual shunt or chamber enlargement
  - Class II-Moderate Complexity
    - Repaired or unrepaired conditions
      - aorto-left ventricular fistula
      - anomalous pulmonary venous connection, partial or total
      - anomalous coronary artery arising from the pulmonary artery
      - anomalous aortic origin of a coronary artery from the opposite sinus

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- AVSD (partial or complete, including primum ASD)
- congenital aortic valve disease
- congenital mitral valve disease
- coarctation of the aorta
- Ebstein anomaly (disease spectrum includes mild, moderate, and severe variations)
- infundibular right ventricular outflow obstruction
- ostium primum ASD
- moderate and large unrepaired secundum ASD
- moderate and large persistently patent ductus arteriosus
- pulmonary valve regurgitation (moderate or greater)
- pulmonary valve stenosis (moderate or greater)
- peripheral pulmonary stenosis
- sinus of Valsalva fistula/aneurysm
- sinus venosus defect
- subvalvular aortic stenosis (excluding HCM; HCM not addressed in these guidelines)
- supravalvular aortic stenosis
- straddling atrioventricular valve
- repaired tetralogy of Fallot
- VSD with associated abnormality and/or moderate or greater shunt

◦ Class III-Great Complexity (or Complex)

- cyanotic congenital heart defect (unrepaired or palliated, all forms)
- double-outlet ventricle
- Fontan procedure
- interrupted aortic arch
- mitral atresia
- single ventricle (including double inlet left ventricle, tricuspid atresia, hypoplastic left heart, any other anatomic abnormality with a functionally single ventricle)
- pulmonary atresia (all forms)
- TGA (classic or d-TGA; CCTGA or l-TGA)
- truncus arteriosus
- other abnormalities of atrioventricular and ventriculoarterial connection (i.e., crisscross heart, isomerism, heterotaxy syndromes, ventricular inversion)

Modalities (CD-11.1.2)

- Echocardiogram-transthoracic (TTE) or transesophageal (TEE)

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  - Transthoracic echocardiography (TTE) is an indispensable tool in the initial and serial follow-up evaluation to identify abnormalities and changes that commonly influence management decisions.
- Cardiac MRI (MRI Cardiac)
  - MRI Cardiac plays a valuable role in assessment of RV size and function, because it provides data that are reproducible and more reliable than data obtained with alternative imaging techniques.
  - For intracardiac congenital heart disease, MRI Cardiac will typically include flow velocity mapping for shunts and flow assessment.
  - Imaging that only requires aortic arch imaging, does not require intracardiac MRI Cardiac, only MRA Chest.
- Cardiac Computed Tomography (CT Cardiac) and Cardiac Computed Tomography Angiography (CTA Cardiac)
  - The most important disadvantage of CT Cardiac (including CT angiography) as an imaging technique is the associated exposure to ionizing radiation.
- Diagnostic heart catheterization
  - (hemodynamic and/or angiographic) in individuals with adult CHD AP classification II and III, or interventional cardiac catheterization in individuals with adult CHD AP classification I to III should be performed by, or in collaboration with, cardiologists with expertise in adult CHD.
- Exercise Testing
  - Exercise test does not imply stress imaging.
- Stress Imaging
  - includes SPECT MPI, stress echo, stress MRI, PET MPI
- Circumstances where MRI Cardiac, CT Cardiac, TEE, and/or diagnostic heart catheterization may be Superior to TTE
  - assessment of RV size and function in repaired Tetralogy of Fallot (TOF), systemic right ventricles, and other conditions associated with right ventricular (RV) volume and pressure overload
  - identification of anomalous pulmonary venous connections
  - serial assessment of thoracic aortic aneurysms, especially when the dilation might extend beyond the echocardiographic windows
  - accurate assessment of pulmonary artery (PA) pressure and pulmonary vascular resistance
  - assessment for re-coarctation of the aorta
  - sinus venosus defects
  - vascular rings
  - evaluation of coronary anomalies
  - quantification of valvular regurgitation

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Coding (CD-11.1.3)

Modality (Abbreviation)	
Transthoracic echocardiogram (TTE)	
93303	Transthoracic echocardiography for congenital cardiac anomalies; complete
93304	TTE for congenital cardiac anomalies; limited study
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93307	TTE (2D) with or without m-mode recording; complete
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
Transesophageal echocardiogram (TEE)	
93312	TEE (2D) including probe placement, imaging, interpretation, and report
93315	TEE for congenital cardiac anomalies; including probe placement, imaging, interpretation, and report
Cardiac MRI (CMR)	
75557	Cardiac MRI for morphology and function without contrast
75561	Cardiac MRI for morphology and function without and with contrast
MRI Chest	
71550	MRI Chest without contrast
71551	MRI Chest with contrast

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Modality (Abbreviation)	
71552	MRI Chest with and without contrast
MR Angiography Chest (MRA Chest)	
71555	MRA Chest (excluding myocardium) with or without contrast
Cardiac CT (CCT)	
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
Coronary CT Angiography (CCTA)	
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
CT Chest	
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71270	Computed tomography, thorax, diagnostic; without contrast material, followed by contrast material(s) and further sections
CT Angiography Chest (CTA Chest)	
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing

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Modality (Abbreviation)	
Stress Echo	
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/ or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/ or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
Stress-perfusion MRI (Stress-perfusion CMR)	
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
Myocardial perfusion imaging SPECT (SPECT MPI)	
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
PET or PET/CT Myocardial perfusion imaging (PET MPI)	
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan

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Modality (Abbreviation)	
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/ or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
Pulmonary perfusion imaging (V/Q)	
78580	Pulmonary perfusion imaging (eg, particulate)
78582	Pulmonary ventilation (eg, aerosol or gas) and perfusion imaging

Cardiac Catheterization Procedure Codes

Codes	Description
93451-93464 93566-93568	**Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve**
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	

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Codes	Description
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
with bypass grafts	
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
with RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
with RHC and bypass grafts	
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
with LHC	
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with LHC and bypass grafts	

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Codes	Description
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
with RHC and LHC	
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**
CPT® 93593 to 93597 are appropriate for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections

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Codes	Description
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

Evidence Discussion (CD-11)

Adult Congenital Heart Disease Imaging

- Management of Adult Congenital heart (ACHD) disease involves a multimodal imaging approach. Multimodal imaging helps account for patient-specific considerations, strengths and weaknesses of each modality, institutional resources, and available expertise. Approaches to limit and monitor radiation exposure are recommended during imaging of individuals with ACHD, and studies that do not involve ionization radiation should be prioritized whenever appropriate.
- Echocardiogram, MRI, CT, catheterization, and nuclear stress testing all have strengths and weaknesses, including varying radiation levels, temporal resolution, spatial resolution, and ability to image blood flow. Advantages of the various modalities are as follows: MRI has the ability to image the right ventricle in 3D; Echocardiograms include high temporal resolution and availability, and the ability to measure pressures with catheterizations; Cardiac CTs have the ability to rapidly acquire 3D imaging; and nuclear imaging allows the ability to measure myocardial perfusion concerns.

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Cardiotoxic Agent-Related Cardiac Dysfunction

Guideline

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Cardiotoxic Agent-Related Cardiac Dysfunction (CD-12)

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Cardiotoxic Agent/Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD) (CD-12.1)

Criteria

Transthoracic Echocardiogram (TTE)

Transthoracic Echocardiogram (TTE) is medically necessary to determine Left Ventricular (LV) function in individuals on cardiotoxic chemotherapeutic drugs.

- 3D echocardiography (CPT® 93319) is medically necessary in addition to the primary TTE and is the preferred echocardiography modality for the assessment of left ventricular ejection fraction (LVEF) and cardiac volumes. See **3D Echocardiography (CD 2.9)**.
- Myocardial strain imaging (CPT® 93356) to obtain a Global Longitudinal Strain (GLS) is medically necessary as an important adjunct in screening for CTRCD. See **Myocardial Strain Imaging (CD 12.2).**

Criteria

Multimodality Imaging

- Guidelines support using echocardiography rather than MUGA for the determination of LVEF and/or wall motion EXCEPT in one of the circumstances described previously in **MUGA Study – Cardiac Indications (CD-3.4)** (see **Background and supporting Information** below).
- CT calcium scoring is considered medically necessary to evaluate for radiation induced CAD when all of the following conditions exist:
  - no presence of symptoms suspicious for ischemia such as chest discomfort located retrosternally, epigastric, or referred pain (pain that is felt in a place different than the source) in the neck, shoulder, arm, or jaw described as pain, pressure, constricting, or tightness occurring with exertion or emotional stress and relieved by rest, nitroglycerin, or both.
  - no clinical history or prior cardiac imaging documenting CAD.
  - no prior calcium score >0.

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- for the initial study, there has been at least 5 years since the last RT (radiotherapy/ radiation) treatment or for subsequent testing, there has been at least 5 years since the last CT calcium scoring.

- Cardiac MRI (CMR) is medically necessary in the evaluation of CTRCD for the following:
  - TTE is not diagnostic
  - Tissue characterization for cardiomyopathy or myocarditis, particularly when Immune Checkpoint Inhibitor Myocarditis is being questioned
  - See also **Cardiac MRI and MRA Chest – Indications (CD 5.2)**.

Criteria

Frequency of CTRCD screening

- Baseline
  - All individuals can have a baseline TTE prior to initiation of cardiotoxic agents.
- During treatment with cardiotoxic agents
  - The frequency of monitoring depends on the agent administered and the individual's baseline cardiovascular toxicity risk. (see **Background and Supporting Information** below)
- Post treatment with cardiotoxic agents surveillance
  - One TTE is medically necessary 3 to 12 months after completion of therapy.
- Adult cancer survivors
  - Long term surveillance TTE is medically necessary every 5 years, except in those with low risk.
  - Additional surveillance TTE at 1 and 3 years after cancer therapy completion is medically necessary in those deemed to be high risk for CTRCD.
- Adult survivors of childhood and adolescent cancer
  - Surveillance TTE is medically necessary every 2 years for survivors with indeterminate risk due to unknown cancer therapy history.
  - Surveillance TTE is medically necessary every 2 years for high risk survivors, defined as a history of any of the following:
    - Radiation dose ≥30 Gy
    - Anthracycline dose of ≥100 mg/m^2 and radiation dose ≥15 Gy
    - Anthracycline dose ≥250 mg/m^2
  - Surveillance TTE is medically necessary every 5 years for moderate risk survivors, defined as a history of any of the following:
    - Radiation dose ≥15 to <30 Gy

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        - Anthracycline dose of < 250 mg/m^2 and radiation dose <15 Gy
    - No screening is medically necessary in low risk survivors, defined as a history of any of the following:
        - Anthracycline dose of >0 to <100 mg/m^2
        - Radiation dose >0 to <15 Gy
- TTE is medically necessary for cancer survivors with a history of chest radiotherapy or anthracycline exposure who are pregnant or planning to become pregnant as follows:
    - Baseline exam
    - 12 weeks of pregnancy if missed the baseline TTE or in high risk survivors
    - 20 weeks of pregnancy for high risk survivors
    - TTE can be repeated for any cardiac symptoms at any other time as needed during or immediately following pregnancy
- For adults who received anthracyclines in childhood, see **Cardiotoxicity and Echocardiography (PEDONC-19.2).**

Background and Supporting Information

- High value screening protocol to detect CTRCD using TTE (CPT® 93306 or 93308) is contingent upon careful baseline cardiotoxicity risk assessment and stratification into low, moderate, and high risk. Currently, there is no universally accepted risk score. Documentation of risk by the provider is sufficient to guide screening strategy.
- Advantages of Echocardiography in comparison to MUGA in individuals on cardiotoxic chemotherapy:
    - no ionizing radiation
    - no IV access required when echo contrast is not used
    - allows view of the pericardium to look for effusion
    - allows estimate of pulmonary pressure
    - may allow visualization of a clot or tumor in the Inferior Vena Cava (IVC) and/or the right heart

Myocardial Strain Imaging (CD-12.2)

Criteria

- Myocardial strain imaging (CPT® 93356) in addition to the primary echocardiogram in individuals receiving therapy with cardiotoxic agents for **any** of the following:
    - Initial evaluation-prior to treatment with **either**:
        - medications that could result in cardiotoxicity/heart failure
        - radiation that could result in cardiotoxicity/heart failure

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- re-evaluation of an individual previously or currently undergoing therapy as per echocardiogram parameters (see **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1))**
- re-evaluation of an individual undergoing therapy with worsening symptoms

Cardiac Myosin Inhibitors for Obstructive Hypertrophic Cardiomyopathy (HCM) (CD-12.3)

Criteria- Monitoring Treatment

Echocardiogram (CPT® 93306) for individuals treated with cardiac myosin inhibitors (including mavacamten or aficamten) for class II-III obstructive HCM as follows:

Titration of cardiac myosin inhibitors to maintenance dose

TTE is considered medically necessary to monitor initiation of cardiac myosin inhibitor therapy (including mavacamten and aficamten) and dose titration as follows:

- baseline study at the beginning of therapy
- every 2 to 8 weeks during dose titration to maintenance dose
- every 3 months once maintenance dose is reached while on medication

Changes symptoms while on cardiac myosin inhibitors

TTE is considered medically necessary while taking cardiac myosin inhibitors to evaluate symptoms or clinical findings that are new since the previous TTE

Changes in treatment

TTE is considered medically necessary when there is a change in treatment while taking a cardiac myosin inhibitors as follows:

- after dose adjustment due to symptoms or clinical findings, or missed doses
- 4 week after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)
- 12 weeks after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)

See also **Hypertrophic Cardiomyopathy (HCM) (CD-14)**

Background and Supporting Information

Hypertrophic Cardiomyopathy (HCM) is a clinical diagnosis, established by imaging with 2D echocardiography or cardiovascular magnetic resonance (CMR) showing a maximal end-diastolic wall thickness of ≥15mm anywhere in the left ventricle, in the absence of another cause of hypertrophy in adults. More limited hypertrophy (13mm-14mm) can be diagnostic, particularly when present in family members of an individual with HCM or in

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conjunction with a positive genetic test, and/or associated with typical dynamic outflow obstruction, or distinctly abnormal ECG patterns.

Evidence Discussion

Cardiac myosin inhibitors, such as mavacamten, require structured echocardiographic monitoring because excessive reduction in contractility may lead to decreased LVEF and heart failure risk. TTE at baseline, 2 weeks to 8 weeks, and 12 weeks after initiation, followed by imaging every 12 weeks during therapy supports a range of prescribing information requirements. Repeat imaging is also supported after treatment interruption, dosage change, initiation of interacting medications such as CYP2C19 or CYP3A4 inhibitors, or new/worsening symptoms. This monitoring approach is consistent with prescribing information and professional society guidance for obstructive HCM treated with cardiac myosin inhibitors. Echocardiography is used to confirm preserved systolic function, assess LVOT gradient response, and identify excessive LVEF reduction that may require treatment interruption or dose adjustment. The evidence base includes pivotal clinical trial data and regulatory labeling demonstrating symptomatic and hemodynamic benefit in selected individuals with obstructive HCM, balanced against the need for ongoing safety monitoring. Broader use outside labeled or guideline-supported populations remains limited by the need for careful selection, serial imaging, and long-term outcome data (Ommen et al., 2024; Bristol Myers Squibb prescribing information).

Coding

Coding

Codes	Description
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78473	Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification
78481	Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification

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Codes	Description
78494	Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing
+78496	Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
+93319	3D echocardiographic imaging and postprocessing during transesophageal echocardiography, or during transthoracic echocardiography for congenital cardiac anomalies, for the assessment of cardiac structure(s) (eg, cardiac chambers and valves, left atrial appendage, interatrial septum, interventricular septum) and function, when performed (List separately in addition to code for echocardiographic imaging)
+93356	Myocardial strain imaging using speckle tracking-derived assessment of myocardial mechanics (List separately in addition to codes for echocardiography imaging)

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Pre- and Post Surgical Cardiac Imaging

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Cardiac Surgery Imaging (CD-13)

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Pre-surgical Cardiac Testing General Information (CD-13.1)

Criteria

- CT Chest without contrast (CPT® 71250) is considered medically necessary prior to cardiac surgery as follows (either):
  - to visualize the extent and location of aortic atherosclerosis
  - to change the operative strategy such as those problematic areas are avoided

Background and Supporting Information

- It is important to differentiate requests for preoperative CT imaging before cardiac surgery according to type of procedure planned:
  - Primary cardiac operation – individuals who have not had prior heart surgery
  - Redo procedures – individuals who have had a prior procedure (it is important to determine the type of procedure as this may impact which modality is most appropriate for the pre-operative assessment)
  - Minimally invasive procedures, such as minimally invasive aortic valve operations, minimally invasive or robotic mitral operations, TAVR, MitraClip™ or other percutaneous valve procedures (such as valve in valve aortic or mitral, percutaneous tricuspid and TMVR which will be increasing in the future)
- In re-operative cardiac surgery, the benefit of preoperative CT is to assess for aortic calcifications, to evaluate the anatomic relationships in the mediastinum, such as the location of the various cardiac chambers and great vessels and proximity to the sternum, and to assess for the location of prior bypass grafts. Information can then be used to change the operative strategy including non-midline approach, peripheral vascular exposure, and alternative cannulation sites and for establishing cardiopulmonary bypass before re-sternotomy. These techniques can result in decreased incidence of intraoperative injury to heart, great vessels and prior bypass grafts and lower rates of postoperative stroke. IV contrast is necessary with these studies to delineate the anatomic structures. However, in individuals with renal insufficiency, the provider might choose to forgo the contrast if they do not want to contrast load the individual prior to placing them on the heart-lung machine.
- Aortic atherosclerosis is recognized as the single most important determinant of postoperative stroke. There is evidence to support that preoperative CT is associated with lower postoperative stroke rates and mortality after primary cardiac surgery.

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Primary Cardiac Surgery – No Previous Cardiac Surgery (CD-13.2)

Criteria

- CT Chest without contrast (CPT® 71250) to evaluate for the presence of ascending aortic calcification is considered medically necessary prior to primary cardiac surgery when there is documented high risk for aortic calcification including any of the following:
  - aortic calcification on chest x-ray or other diagnostic test (TEE, fluoroscopy, etc.)
  - calcific aortic stenosis
  - end stage renal disease (dialysis)

Re-operative Cardiac Surgery (CD-13.3)

Criteria

- **One** of the following tests for preoperative assessment:
  - CT Chest with contrast
  - CTA Chest
  - CCTA only if prior CABG (this might be in addition to CT with contrast as CCTA will not show the extent of the thoracic aorta that needs to be visualized)
  - CT Heart usually does not provide the necessary information and is not medically necessary routinely.

Minimally Invasive or Robotic Cardiac Surgery (CD-13.4)

Criteria

- CTA Chest CPT® 71275 (or CT Chest with contrast CPT® 71260) and CTA Abdomen and Pelvis CPT® 74174 (or CT Abdomen and Pelvis with contrast CPT® 74177) are considered medically necessary for pre-operative planning when minimally invasive or robotic cardiac surgical procedures are being considered including any of the following:
  - valve repair or replacement
  - coronary artery bypass graft surgery
  - aortic root or ascending aorta repair
  - resection of intracardiac tumor, or thrombus or vegetation
  - open lead extraction
  - atrial septal defect repair

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Transcatheter Valve Interventions (CD-13.5)

Criteria

Transcatheter Mitral Valve Repair (TMVR) (mitral valve clip)

Pre-procedure imaging

All of the following imaging studies are considered medically necessary to determine eligibility for TMVR or for pre- procedure planning:

- Transthoracic echo (TTE) with or without 3D rendering
- Transesophageal echo with or without 3D rendering
- Heart catheterization, including coronary angiography and right heart catheterization if requested
- CT Cardiac Morphology CPT® 75572
- CTV Chest CPT® 71275
- CTV Abdomen and Pelvis CPT® 74174

Post-procedure follow-up

Post-procedure transthoracic echo (TTE) can be performed at the following intervals:

- 1 month
- 6 months
- 1 year
- then annually

Transcatheter Tricuspid Valve Replacement (TTVR) (tricuspid valve clip)

Pre-procedure imaging

All of the following imaging studies are considered medically necessary to determine eligibility for TTVR or for pre-procedure planning:

- Transthoracic echo (TTE) with or without 3D rendering
- Transesophageal echo with or without 3D rendering
- CT Cardiac Morphology CPT® 75572
- CTV Chest CPT® 71275
- CTV Abdomen and Pelvis CPT® 74174

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Cardiac CT (CPT® 75572) is recommended in individuals with radiation-induced valve disease.

Post-procedure follow-up

- TTE (CPT® 93306) is considered medically necessary post-procedure at the following intervals:
  - 1 month
  - 6 months
  - 1 year
  - then annually

CT Imaging in Transcatheter Aortic Valve Replacement (TAVR)

Criteria

Pre-TAVR imaging

Pre-aortic valve replacement

- Once the decision has been made for aortic valve replacement, the following may be used to determine if an individual is a candidate for TAVR:
  - CTA Chest (CPT® 71275), Abdomen and Pelvis (combination code CPT® 74174) are considered medically necessary; and
  - CT Cardiac Morphology (CPT® 75572) is considered medically necessary to measure the aortic annulus; or
  - CTA Cardiac (CPT® 75574) is considered medically necessary to both measure the aortic annulus and assess the coronary arteries in lieu of heart catheterization.
- A repeat diagnostic left heart catheterization is **not** considered medically necessary when the individual is undergoing a transcatheter aortic valve replacement (TAVR).

Transfemoral access not feasible

Alternative imaging can be obtained to evaluate vascular access for TAVR in individuals for whom it is documented either via the office note or prior imaging that transfemoral access would not be feasible due to **any** of the following exclusion criteria:

- small vessels
- highly calcified vessels
- stenosed or occluded vessels
- prior aortoiliac vascular intervention

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Imaging is medically necessary based on the documented intended access site (transaxillary or transcarotid) and should be of the involved body areas. The following studies are medically necessary based on the documented planned access site:

- CTA Head (CPT® 70496) or CTA Neck (CPT® 70498) or CTA Head and Neck (CPT® 70471) for transcarotid access
- CTA Chest (CPT® 71275) and/or Upper Extremity (CPT® 73206) for transaxillary access

Post-TAVR imaging

CT Cardiac (CPT® 75572) is considered medically necessary after TAVR in the setting of **any** of the following:

- post-TAVR TTE is indeterminate or raises a concern about **any** of the following:
  - valve thrombosis
  - infective endocarditis
  - structural degeneration
- A Valve-in-Valve implantation or surgical re-do AVR is being contemplated
- concern for hypoattenuated leaflet thickening (HALT) or other forms of bioprosthetic valve dysfunction due to an increase in mean transvalvular gradient of ≥10mmHg from baseline.
- Routine CT surveillance or follow up for incidental Hypoattenuated Leaflet Thickening (HALT) with or without restricted leaflet motion, also referred to as Hypoattenuation Affecting Motion (HAM), is NOT medically necessary.

Evidence Discussion

The American Heart Association scientific statement recognizes preoperative chest CT as a highly sensitive method for identifying aortic atherosclerosis, an important potential source of embolic stroke during cardiac surgery. In one cohort of 284 patients scheduled for nonemergent coronary artery bypass grafting, CT identified severe atherosclerotic lesions that made cannulation or cross-clamping high risk in 12.7% of patients. The statement notes that myocardial revascularization guidance recommended preoperative CT in those with evidence of extensive generalized atherosclerosis. When severe aortic disease is identified, modification of the operative technique to minimize aortic manipulation and reconsideration of the overall surgical risk-benefit balance are advised. (Gaudino et al., 2020).

A 2026 American College of Radiology review found that a meta-analysis of 18 studies involving 4,057 patients undergoing first-time cardiac surgery suggested that preprocedural CT may reduce perioperative stroke and mortality. The potential benefit was attributed to changes in aortic cannulation site, use of an off-pump approach, or cancellation or modification of surgery when extensive aortic disease was identified. However, much of the evidence was observational, and at least one retrospective case-

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control study of 405 patients found that aortic calcification was more frequent among patients who developed postoperative stroke, but the differences were not statistically significant.(Malik et al., 2026).

Observational studies and meta-analyses have reported that preoperative CT is useful before repeat cardiac surgery. CT can identify high-risk anatomy, including extensive aortic calcification and a distance of less than 10 mm between the sternum and the right ventricle, aorta, or bypass graft. Identification of these findings resulted in cancellation of surgery in approximately 4% to 13% of cases and modification of the operative strategy in up to 80%. Other reported benefits included fewer sternal re-entry injuries, shorter perfusion or cross-clamp times, shorter intensive care unit stays, and possible reductions in perioperative myocardial infarction and stroke. Interpretation is constrained by predominantly nonrandomized study designs, differences in surgical populations and CT protocols, and the possibility of selection and surgical-expertise bias (Malik et al., 2026).

Trans-catheter Aortic Valve Replacement (TAVR)

The success of a Trans-catheter Aortic Valve Replacement (TAVR) procedure is contingent upon a meticulous pre-TAVR planning imaging study where cardiac CT allows accurate annulus sizing, coronary heights measurement, and calcification distribution evaluation, in addition to access site planning. Post-operatively, clinically suspected complications such as thrombus formation, infective endocarditis, or structural degeneration can be confirmed on a cardiac CT; a routine surveillance strategy, however, is not supported because of unclear or even potentially harmful outcome of treating incidental findings.

Transcatheter Mitral Valve Repair (mitral valve clip)

In non-interventional settings, cardiac CT provides an alternative to cardiac MRI when structural information cannot be adequately obtained by an echocardiography. Most notably, the evaluation of a cardiac mass, extent of pericardial disease, complex congenital heart disease and cardiomyopathy, can be performed by a cardiac CT when cardiac MRI is not available or contraindicated. Percutaneous treatment of mitral regurgitation can be accomplished using venous access to apply a clip device (e.g., MitraClip currently FDA approved) to provide edge-to-edge mitral leaflet coaptation, approximating opposing sections of the anterior and posterior mitral valve leaflets. FDA approved indications include treatment for individuals with symptomatic, moderate to severe, or severe primary mitral regurgitation whose surgical risks are prohibitive, as well as symptomatic moderate to severe or severe secondary mitral

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regurgitation who have failed optimal medical therapy. This therapy should include, if medically necessary, cardiac resynchronization therapy.

Transcatheter Mitral & Tricuspid Valve Replacement

Transcatheter Tricuspid Valve Replacement device (EVOQUE) is currently FDA approved. In individuals being considered for transcatheter tricuspid or mitral valve replacement, Cardiac CT (CPT® 75572) provides detailed imaging of the valve annulus including measurement of valve annulus to guide selection of the appropriate-sized valve. CTV Chest (CPT® 71275) and CTV Abdomen and Pelvis (CPT® 74174) provide imaging of the iliac veins and inferior vena cava to exclude stenosis or significant tortuosity and aid in determining eligibility and procedure planning.

Coding

Code	Description
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
73206	Computed tomographic angiography, upper extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium

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Code	Description
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)

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Hypertrophic Cardiomyopathy

Guideline

Hypertrophic Cardiomyopathy (HCM) (CD-14)
References (CD-14)

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Hypertrophic Cardiomyopathy (HCM) (CD-14)

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Criteria

Screening

- For screening for inherited hypertrophic cardiomyopathy, see **Transthoracic Echocardiography (TTE-Indications (CD-2.2)** and **Frequency of Echocardiography Testing (CD-2.3).**

Initial imaging, new or changed symptoms

Transthoracic echocardiography (TTE)

- TTE is medically necessary for the initial evaluation of a genotype positive individual with inherited hypertrophic cardiomyopathy.

Transesophageal echocardiography (TEE) (CPT® 93312, 93320, 93325)

- TEE is medically necessary for the evaluation of individuals with hypertrophic cardiomyopathy if TTE is inconclusive for **any** of the following:
  - mitral regurgitation secondary to structural abnormalities of the mitral valve
  - subaortic membrane or aortic valve stenosis

Stress echocardiogram

- Exercise stress echo (CPT® 93351 or 93350) is medically necessary for the detection and quantification of dynamic left ventricular outflow tract obstruction in symptomatic individuals with HCM who do **not** have a resting or provocable outflow tract gradient ≥50 mm Hg on TTE.
- Stress echo can be repeated when there is documentation of **any** of the following:
  - In 1 to 2 years if the resting or provocable outflow tract gradient is <30 mm Hg on prior stress echo
  - Worsening symptoms
  - There has been a therapeutic change (e.g., change in medication, surgical procedure performed).

Cardiac CTA (CPT® 75574)

- Initial imaging study in individuals with hypertrophic cardiomyopathy and stable anginal symptoms

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- Chest discomfort is common in individuals with hypertrophic cardiomyopathy. The incidence of false positive myocardial perfusion imaging abnormalities is higher in these individuals, whereas the incidence of severe coronary artery stenosis is low.

Cardiac MRI (CMR)

- Cardiac MRI (CPT® 75557 or CPT® 75561) is considered medically necessary when TTE is inconclusive or nondiagnostic for HCM.

Pre-procedure testing

All of the following modalities are considered medically necessary:

- TTE
- CMR
- TEE for pre-procedure planning for surgical myectomy or alcohol septal ablation
- Left heart catheterization with coronary arteriography to rule out coronary artery disease prior to planned surgical myectomy.

Post- Septal Reduction Therapy (SRT)

TTE is medically necessary within 3 to 6 months after SRT (surgical myectomy or alcohol septal ablation) to evaluate the procedural results in individuals with hypertrophic cardiomyopathy

Surveillance imaging

- TTE is considered medically necessary every year in individuals who have no change in clinical status or treatment.

Criteria- Monitoring Treatment

Echocardiogram (CPT® 93306) for individuals treated with cardiac myosin inhibitors (including mavacamten or aficamten) for class II-III obstructive HCM as follows:

Titration of cardiac myosin inhibitors to maintenance dose

TTE is considered medically necessary to monitor initiation of cardiac myosin inhibitor therapy (including mavacamten and aficamten) and dose titration as follows:

- baseline study at the beginning of therapy
- every 2 to 8 weeks during dose titration to maintenance dose

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- every 3 months once maintenance dose is reached while on medication

Changes symptoms while on cardiac myosin inhibitors

TTE is considered medically necessary while taking cardiac myosin inhibitors to evaluate symptoms or clinical findings that are new since the previous TTE

Changes in treatment

TTE is considered medically necessary when there is a change in treatment while taking a cardiac myosin inhibitors as follows:

- after dose adjustment due to symptoms or clinical findings, or missed doses
- 4 week after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)
- 12 weeks after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)

HCM Supporting Information

Background and Supporting Information

Hypertrophic Cardiomyopathy (HCM) is a clinical diagnosis, established by imaging with 2D echocardiography or cardiovascular magnetic resonance (CMR) showing a maximal end-diastolic wall thickness of ≥15mm anywhere in the left ventricle, in the absence of another cause of hypertrophy in adults. More limited hypertrophy (13mm-14mm) can be diagnostic, particularly when present in family members of an individual with HCM or in conjunction with a positive genetic test, and/or associated with typical dynamic outflow obstruction, or distinctly abnormal ECG patterns.

Evidence Discussion

The peer-reviewed published literature and professional society guidelines support transthoracic echocardiography (TTE) as the primary initial imaging modality for suspected or known hypertrophic cardiomyopathy (HCM). HCM is diagnosed by imaging evidence of otherwise unexplained left ventricular hypertrophy, typically maximal end-diastolic wall thickness ≥15 mm in adults, or 13–14 mm when supported by family history, genetic testing, abnormal electrocardiographic findings, or typical dynamic obstruction. TTE provides assessment of wall thickness distribution, left ventricular systolic function, diastolic filling, mitral valve anatomy, systolic anterior motion, and left ventricular outflow tract (LVOT) gradients. Current AHA/ACC and ESC guidelines recommend echocardiography for initial diagnosis and for phenotype screening in first-degree relatives or genotype-positive individuals because HCM expression may be age dependent and may evolve over time (Ommen et al., 2024; Ommen et al., 2020; Arbelo et al., 2023).

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Cardiac myosin inhibitors, such as mavacamten, require structured echocardiographic monitoring because excessive reduction in contractility may lead to decreased LVEF and heart failure risk. TTE at baseline, 2 weeks to 8 weeks, and 12 weeks after initiation, followed by imaging every 12 weeks during therapy supports a range of prescribing information requirements. Repeat imaging is also supported after treatment interruption, dosage change, initiation of interacting medications such as CYP2C19 or CYP3A4 inhibitors, or new/worsening symptoms. This monitoring approach is consistent with prescribing information and professional society guidance for obstructive HCM treated with cardiac myosin inhibitors. Echocardiography is used to confirm preserved systolic function, assess LVOT gradient response, and identify excessive LVEF reduction that may require treatment interruption or dose adjustment. The evidence base includes pivotal clinical trial data and regulatory labeling demonstrating symptomatic and hemodynamic benefit in selected individuals with obstructive HCM, balanced against the need for ongoing safety monitoring. Broader use outside labeled or guideline-supported populations remains limited by the need for careful selection, serial imaging, and long-term outcome data (Ommen et al., 2024; Bristol Myers Squibb prescribing information).

Coding

Code	Description
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93312	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report

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Code	Description
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

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Perinatal Imaging in Cardiovascular Disease

Guideline

Diagnostic Cardiovascular Imaging Pre-Pregnancy to Post-Partum (CD-15.1)
Maternal Imaging in Cardiovascular Disease (CD-15.2)
Maternal Imaging in Individuals with Aortopathy (CD-15.3)
Imaging in Pregnancy with Congenital Heart Disease (CHD) (CD-15.4)
References (CD-15)

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Diagnostic Cardiovascular Imaging Pre-Pregnancy to Post-Partum (CD-15.1)

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Peripartum Red Flag Signs and Symptoms

Imaging as requested, as listed within **Imaging Modalities in Maternal Imaging** (Echocardiogram, Exercise stress echo, Coronary angiography, Cardiac MRI), is medically necessary for peripartum individuals for any of the following **red flag** signs or symptoms:

- chest pain
- dyspnea
- orthopnea
- cough
- lower extremity edema when there is a concern for heart disease
- tachycardia
- unheralded syncope
- headache
- acute visual changes
- new onset hypotension
- hypertension

Imaging Modalities

General information

Ultrasound and magnetic resonance are the preferred imaging modalities to minimize radiation exposure in pregnancy. When imaging using ionizing radiation is necessary, radiation exposure should follow the ALARA principle (As Low As Reasonably Achievable). Shared decision-making regarding diagnostic testing should occur in consultation with the individual, cardiologist, and obstetrical team when weighing the risk of fetal exposure to radiation against the need to diagnose or plan treatment for serious illness.

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Transthoracic echocardiography (TTE)

- TTE (CPT® 93306) is the primary cardiac imaging modality in pregnancy. Baseline and surveillance echocardiography is medically necessary for several conditions as noted in **Maternal imaging in cardiovascular disease (CD-15.2)** Table 1.
- A repeat echocardiogram is medically necessary when there are new or worsening cardiovascular signs or symptoms, as described in **Peripartum Red Flags**, **Transthoracic Echocardiography (TTE)– Indications/initial evaluation (CD-2.2)** and **Frequency of Echocardiography Testing (CD-2.3)**, during and after pregnancy.

Exercise Stress Echo

- Exercise stress echo (CPT® 93350, 93351) is medically necessary pre-conception to assist with risk stratification in individuals with a documented history of **any** of the following:
  - current left ventricular dysfunction
  - previous history of left ventricular dysfunction
  - valvular heart disease of any severity
  - There is a concern for myocardial reserve.
- See Stress echocardiogram in **Stress Testing with Imaging – Indications (CD-1.4)** and **Stress echo–indications other than ruling out CAD (CD-2.7)**.
- See **Hypertrophic Cardiomyopathy (CD-14).**

Coronary Angiography

- Fetal risk from ionizing radiation is highest before 20 weeks gestational age. When coronary angiography is medically necessary, the ALARA principle should be followed. Invasive management of acute coronary syndrome is associated with lower in-hospital mortality and should be considered. See **Diagnostic Heart Catheterization**.

Cardiac MRI

- Cardiac MRI (CPT® 75557) is utilized in pregnant individuals to measure aortic dimensions, wall motion, and ventricular function when the echocardiogram is non-diagnostic. Gadolinium-based contrast agents are not necessary in aortic imaging or most other indications in pregnancy. See **Cardiac MRI**.

Evidence Discussion

- Cardiovascular disease (CVD) in pregnancy has become increasingly prevalent in recent years.
- The increase in plasma volume during pregnancy requires significant physiological adaptation.
- Maternal mortality has increased in the last two decades with CVD accounting for 33% of all deaths.

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- Invasive management of myocardial infarction (MI) is associated with lower in-hospital mortality.
- Research has underrepresented females of childbearing age leading to significant deficits in our knowledge of cardiovascular care of these individuals.
- Cardiac Imaging using ionizing radiation
  - Multiple imaging modalities expose the pregnant individual and fetus to ionizing radiation.
  - This exposure causes concern for an elevated risk of childhood cancer.
  - Shared decision-making should be employed when weighing the fetal exposure to radiation against the need to diagnose serious illness.

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Maternal Imaging in Cardiovascular Disease (CD-15.2)

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Criteria

Table 1: Suggested frequency of echo monitoring during pregnancy

Cardiovascular disease	Monitoring frequency
Hypertensive disorders of pregnancy (BP ≥130/90)	• An echocardiogram (TTE) (CPT® 93303, 93304, 93306, 93307, 93308) is medically necessary once during pregnancy in all hypertensive disorders of pregnancy. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Valvular disorders/ Native and Prosthetic	• 1 TTE is medically necessary during the first trimester (weeks 1-12 of pregnancy) for individuals with known or suspected valvular heart disease. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Severe Aortic stenosis (AS)	• A repeat TTE is medically necessary every 1-2 months or when there are new or worsening cardiovascular signs or symptoms.
Mitral stenosis (MS)	• TTE is medically necessary each trimester (12 weeks) and prior to delivery in individuals with mild MS. • TTE is medically necessary every 1–2 months in individuals with moderate to severe MS. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Dilated cardiomyopathy	• TTE is medically necessary during each trimester (12 weeks). • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.

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Cardiovascular disease	Monitoring frequency
Hypertrophic cardiomyopathy	• TTE is medically necessary in **asymptomatic** individuals each trimester. • TTE is medically necessary in **symptomatic** individuals every 1-2 months. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Peripartum cardiomyopathy	• TTE is medically necessary in individuals with signs and symptoms of heart failure. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms. ◦ TTE is medically necessary in subsequent pregnancies: ▪ at the time of the first prenatal visit ▪ at the end of the first and second trimesters ▪ 1 month prior to delivery ▪ after delivery prior to discharge ▪ 1 month postpartum ▪ at any time when there are worsening signs or symptoms of heart failure • TTE is medically necessary as requested when the individual is being treated with Cabergoline
Pulmonary hypertension	• TTE is medically necessary in individuals with signs and symptoms of pulmonary hypertension. • A repeat TTE is medically necessary at the discretion of the health care provider.

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Maternal Imaging in Individuals with Aortopathy (CD-15.3)

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Criteria

Pre-pregnancy imaging

Individuals at risk for aortic aneurysms **(Table 15-3-1)** should be evaluated with echocardiogram (TTE) **and** Computed Tomography (CT)/Magnetic Resonance Imaging (MRI) of the Chest/Abdomen/Pelvis **(Table 15-3-2)** within 1 year prior to conception to evaluate for aortic valve disease and aortic dimensions.

Table 15-3-1

Individuals at risk for aortic aneurysm, aortic dissection, limb-threatening ischemia
Bicuspid Aortic Valve
Turner Syndrome
Coarctation of the Aorta
Marfan Syndrome
Type IV Ehlers-Danlos
Loeys-Dietz
Familial Thoracic Aortic Disease and Aortic Dissection (defined as first-degree relative with history of aortic dissection or thoracic aortic aneurysm or two second-degree relatives with history of aortic dissection or thoracic aortic aneurysm)

Table 15-3-2

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Imaging for Aortic conditions	CPT®
CT Chest and/or Abdomen and/or Pelvis	71260 74177 74160 72193
CTA Chest and/or Abdomen and/or Pelvis	71275 74175 72191 74174
MRA Chest and/or Abdomen and/or Pelvis	71555 74185 72198
Transthoracic Echocardiogram (TTE)	93303 93304 93306 93307 93308
Transesophageal Echocardiogram (TEE)	93312 93313 93314 93315 93316 93317

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Imaging for Aortic conditions	CPT®
Doppler echocardiography is medically necessary as add-on codes for TEE	+93320 +93321 +93325

Surveillance imaging during pregnancy and postpartum

Follow-up imaging with Echocardiogram (TTE) and CTA/MRA. TEE can be substituted if TTE is equivocal.

Suggested Frequency of Aortic Imaging during pregnancy and postpartum in individuals known to be high-risk for aortic aneurysm

Table 15-3-3

Condition	WHO Class	Imaging frequency	Postpartum (up to 42 days after birth)
Turner Syndrome	• II-III: Aortic root <20mm/m^2 with associated risk factors or <25mm/m without associated risk factors	• Once during pregnancy if normal aortic dimension, or every 2 months if repaired coarctation	• Once during the postpartum period
	• IV: Aortic root ≥20mm/m2 with associated risk factors or ≥25mm/m without associated risk factors	• Every 6 weeks if aorta diameter dilated >30mm	• Once during the postpartum period
	• Any individual with Turner who has severe coarctation	• At discretion of provider	• Once during the postpartum period
Marfan Syndrome	• III: Aortic root <45mm, mod-severe Aortic Insufficiency	• Every trimester if <40mm	• Once during the postpartum period
	• IV: Aortic root ≥45mm, history of dissection	• Every 6 weeks if aorta is ≥40mm	• Once during the postpartum period

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Condition	WHO Class	Imaging frequency	Postpartum (up to 42 days after birth)
Vascular Ehlers-Danlos	• Type IV	• Every 6 weeks	• Once during the postpartum period
Loeys-Dietz	• III: Aortic diameter <40mm	• Every 6 weeks	• Once during the postpartum period
	• IV: Aortic diameter ≥40mm	• Every 6 weeks	• Once during the postpartum period
Familial thoracic aortic aneurysms and dissections	• III: Aortic diameter <40mm	• Every trimester if <40mm aortic diameter	• Once during the postpartum period
	• IV: Aortic diameter ≥40mm	• Every 6 weeks if ≥40mm aortic diameter	• Once during the postpartum period

Background and Supporting Information

First-degree relative (sibling, parent, child)

Second-degree relative (aunt/uncles, grandparent, niece, nephew, cousin, or half-sibling of an individual)

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Imaging in Pregnancy with Congenital Heart Disease (CHD) (CD-15.4)

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Criteria

Pre-pregnancy imaging based on the World Health Organization (WHO) chart for imaging in pregnancy with CHD

Imaging modality and indication	CPT®
Echocardiogram (TTE) when planning pregnancy	93306
TEE if TTE equivocal	93312
CMR (cardiac MRI) can be performed prior to pregnancy in those lesions where CMR would be routinely performed at some later date	75557
CTA or MRA of chest if known aortic disease, Pulmonary artery disease, anomalous pulmonary veins, anomalous systemic veins (also see peripartum aortopathy table)	71275, 71555
Echocardiogram with new signs or symptoms	93303, 93304, 93306, 93308
Postpartum imaging per provider requested frequency	imaging as noted above
Stress imaging pre/during pregnancy when known coronary artery anomaly, pulmonary hypertension, LVOT obstruction, cardiac dysfunction, single ventricle	93350, 93351, 93320, 93325
WHO II, III, IV, can have echo/MR/CT/stress imaging prior to pregnancy	imaging as noted above

- Congenital heart disease imaging in pregnancy
  - Echocardiogram (TTE) when planning pregnancy
  - TEE if TTE equivocal

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- CMR can be performed prior to planning pregnancy in those lesions where CMR would be routinely performed at some later date.
- CTA Chest or MRA Chest of arch if known disease with aortic involvement or if known dilation
- Repeat echocardiogram and MR (can be without gad) can be performed based on the WHO classification II, III, IV, or other risk factors.
- Severe complex CHD TTE (CPT® 93306)
  - Every 2-4 weeks for major physiological changes
  - As often as needed for any of the following:
    - pulmonary hypertension
    - changes in function
    - to guide delivery after 24 weeks
- Echocardiogram can be performed if there are new signs or symptoms during pregnancy.
- Postpartum first year can have more frequent imaging.
- Stress imaging pre/during pregnancy for individuals with known coronary artery anomaly, pulmonary hypertension, LVOT obstruction, cardiac dysfunction, single ventricle.
- WHO II, III, IV can have echocardiogram/MR/CT/stress imaging prior to pregnancy
- WHO I-one echocardiogram during pregnancy
- WHO II-one echocardiogram per trimester during pregnancy
- WHO II/III-echocardiogram every 2 months during pregnancy
- WHO III/IV-echocardiogram monthly during pregnancy
  - Individuals may require more (even weekly) if treatment decision, delivery is considered.

- Syndromes that allow cardiac imaging at the time of diagnosis if not previously done. This list is not exhaustive.
  - DiGeorge/velocardiofacial (22q11.2)
  - Down syndrome (trisomy 21)
  - Holt Oram (TBX5)
  - Klinefelter syndrome (47 XXY)
  - Noonan (PTPN11, KRAS, SOS1 RAF1, NRAS, BRAF, MAP2K1)
  - Turner (45X)
  - Williams (7q11.23 deletion)
  - any syndrome associated with congenital heart disease
- Echocardiogram at time of diagnosis (either genetic testing or clinical features)
- CMR or CCTA if arch involved in disease.

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Surveillance Imaging

Surveillance imaging after baseline studies

After initial imaging, TTE should be performed at regular intervals. For individuals with aortopathy, Chest MRA may be added at the same frequency. If echocardiographic imaging is known to be poor or inadequate, CMR may be used instead of TTE.

The World Health Organization modified classification of maternal cardiovascular risk

The World Health Organization established a modified classification of maternal cardiovascular risk used as a tool to evaluate risk status for pregnant individuals with various cardiovascular conditions.

Class	Risk	Sample Lesions
WHO Class I	No detectable increased risk of maternal mortality and no or mild increase in morbidity.	• Mild Pulmonary stenosis • Small PDA • Mild MVP • Successfully repaired simple lesions (ASD, VSD, PDA, anomalous pulmonary venous drainage) • Isolated PACs or PVCs
WHO Class II	Small increased risk of maternal mortality or moderate increase in morbidity.	• Un-operated ASD or VSD • Repaired TOF (uncomplicated) • Most arrhythmias
WHO Class II-III	Intermediate increased risk of maternal mortality or moderate to severe increase in morbidity.	• Mild left ventricular impairment • Hypertrophic cardiomyopathy • Native or tissue valvular heart disease not considered WHO I or IV • Aorta <45 mm in aortic disease associated with bicuspid aortic valve • Repaired coarctation

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Class	Risk	Sample Lesions
WHO Class III	Significantly increased risk of maternal mortality or severe morbidity. • Expert counseling required. • If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth, and the postpartum period.	• Mechanical valve • Systemic right ventricle • Fontan circulation • Unrepaired cyanotic heart disease • Other complex congenital heart disease
WHO Class IV	Extremely high-risk of maternal mortality or severe morbidity. • Pregnancy contraindicated. • If pregnancy occurs, termination should be discussed. • If pregnancy continues, care for as WHO class III.	• Pulmonary arterial hypertension from any cause • Severe systemic ventricular dysfunction (LVEF <30%, NYHA functional class III-IV) • Severe mitral stenosis; severe symptomatic aortic stenosis • Aortic dilation ≥50mm in aortic disease associated with bicuspid aortic valve • Native severe coarctation of the aorta

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Cardiac Imaging in Individuals with Known or Planned Transplants

Guideline

Cardiac Imaging in Transplants (CD-16)
References

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Cardiac Imaging in Transplants (CD-16)

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Criteria

Non-cardiac transplants

- Stress Testing in Individuals for Non-Cardiac Transplant
  - Imaging stress testing every year (stress echocardiogram, SPECT MPI, stress MRI, or PET MPI per the transplant center's protocol) is medically necessary prior to transplant for candidates for any type of organ, bone marrow, or stem cell transplant. See **Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)**.
  - An imaging stress test can be repeated annually after transplant for at least 2 years or within 1 year of a prior cardiac imaging study if there is evidence of progressive vasculopathy.
  - After 2 consecutive normal imaging stress tests, repeated testing is not medically necessary more often than every other year without evidence for progressive vasculopathy or new symptoms.
  - Stress testing after 5 years may proceed according to normal patterns of consideration.

Cardiac transplant

- Pre-Cardiac Transplant evaluation
  - One of the following is considered medically necessary for candidates being evaluated for heart transplant as suggested by the transplant center protocol:
    - SPECT MPI
    - Stress MRI
    - Stress echocardiogram
    - PET MPI
  - All of the following modalities are considered medically necessary for an individual being evaluated for cardiac transplant:
    - CT Chest (CPT® 71250 or 71260) **and**
    - Abdominal imaging with: Ultrasound Abdomen (CPT® 76700 or 76705) or CT Abdomen (CPT® 74150 or 74160) and/or MRI Abdomen (CPT® 74181 or 74183) **and**
    - Right heart catheterization (CPT® 93451) or Right and left heart catheterization (CPT® 93453) or left heart catheterization (CPT® 93458)
- Post-Cardiac transplant assessment:

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- Echocardiogram, 3D echocardiogram (CPT® 93319, CPT® 76376, CPT® 76377,) and strain imaging (CPT® 93356) is considered medically necessary as needed per transplant protocol
- CTA Cardiac is considered medically necessary to evaluate for transplant vasculopathy
- **One** of the following imaging studies is considered medically necessary annually:
  - SPECT MPI (CPT® 78451, CPT® 78452)
  - Stress echocardiogram (CPT® 93350, CPT® 93351)
  - Stress MRI (CPT® 75559, CPT® 75563)
  - PET MPI (CPT® 78430, CPT® 78431, CPT® 78491, CPT® 78492)

Background and Supporting Information

Individuals who have undergone organ transplant are at increased risk for ischemic heart disease secondary to their medication. Risk of vasculopathy is 7% at 1-year, 32% at 5 years, and 53% at 10 years.

For individuals being evaluated for cardiac transplant, MRI may be performed as the initial abdominal imaging modality or for further evaluation after initial abdominal imaging with Ultrasound or CT.

Evidence Discussion

Stress testing with imaging is medically necessary to exclude the presence of significant coronary artery disease as part of evaluating candidacy for any type of organ, bone marrow, or stem cell transplant. While on the transplant waiting list, stress testing with imaging is medically necessary annually to exclude progression of coronary artery disease. Stress testing with any imaging modality (stress echo, SPECT MPI, stress MRI, or stress cardiac PET perfusion) is supported per the transplant center's protocol. Recommendations regarding stress testing with imaging for pre-transplant evaluation are provided in established evidence-based medical specialty organization guidelines.

Stress testing with imaging also has a role in surveillance following cardiac transplant to evaluate for development of obstructive coronary artery disease due to cardiac allograft vasculopathy. Stress testing with any imaging modality (stress echo, SPECT MPI, stress MRI, or stress cardiac PET perfusion) is medically necessary annually post cardiac transplant. Recommendations regarding stress testing with imaging for post cardiac transplant surveillance are provided in established evidence-based medical specialty organization guidelines.

Codes Included

- SPECT MPI (CPT® 78451, 78452)
- Stress echocardiogram (CPT® 93350, 93351)

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- Stress MRI (CPT® 75559, 75563)
- PET MPI (CPT® 78430, CPT® 78431, CPT® 78491, 78492)
- CT Chest (CPT® 71250 or 71260)
- CCTA (CPT® 75574) for transplant vasculopathy
- Ultrasound abdomen (CPT® 76700 or 76705)
- CT Abdomen (CPT® 74150 or 74160)
- MRI Abdomen (CPT® 74181 or 74183)
- Right heart catheterization (CPT® 93451)
- Right and left heart catheterization (CPT® 93453)
- Left heart catheterization (CPT® 93458)
- Echocardiogram (CPT® 93306)
- 3D echocardiogram (CPT® 93319, 76376, 76377)
- Strain imaging (CPT® 93356)

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Cardiac Sarcoidosis

Guideline

Cardiac Sarcoidosis (CD-3.9)
References (CD-3.9)

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Cardiac Sarcoidosis (CD-3.9)

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Criteria

Suspected cardiac sarcoidosis

- Cardiac MRI with gadolinium (CPT® 75561) is medically necessary initial imaging for identification of suspected cardiac sarcoidosis.
- Cardiac PET (CPT® 78432 or 78433) **or** PET metabolic study (CPT® 78459 or 78429) and SPECT perfusion image (CPT® 78451) is medically necessary for suspected cardiac sarcoidosis for any of the following indications:
  - initial imaging when there is a contraindication to MRI imaging (non MRI-safe pacemaker, renal failure)
  - initial Cardiac MRI is equivocal or additional information is needed based on results from the MRI
  - to confirm diagnosis if suggested by MRI
  - initial imaging to evaluate for suspected cardiac sarcoidosis when there is documented sarcoidosis outside of the heart

Monitoring of treatment of established cardiac sarcoidosis

- PET-Cardiac PET metabolic is medically necessary to monitor therapy in cardiac sarcoidosis. Requires PET with F-18 FDG metabolic study combined with a PET perfusion study (CPT® 78432 or 78433) OR PET metabolic study (CPT® 78459 or 78429) and SPECT perfusion image (CPT® 78451).
  - prior to treatment of cardiac sarcoidosis
  - PET (heart FDG metabolic with perfusion study as above) can be repeated at 3-6 month intervals if there is active disease or to make therapeutic decisions.

Evidence Discussion

- Cardiac imaging is reasonable to detect cardiac sarcoidosis in the following:
  - any individual with extra cardiac sarcoidosis even if no cardiac symptoms
  - echo with basal thinning of the intraventricular septum, depressed LVEF <50 or regional wall motion abnormality not associated with CAD
  - young individuals with unexplained ventricular tachycardia, especially monomorphic VT

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  - individuals with unexplained cardiomyopathy or heart failure (i.e., CAD has been ruled out)
  - individuals with unexplained arrhythmia especially advanced AV block or VT
- Initial imaging should be cardiac MRI with late gadolinium enhancement (LGE) protocol unless there is a contraindication to MRI imaging (non MRI-safe pacemaker, renal failure). Absence of LGE is a strong negative predictor for low rates of cardiac morbidity and mortality from cardiac sarcoidosis and further testing is not usually medically necessary.
- PET – Metabolic imaging with F-18 FDG for diagnosis if there is a contraindication to MRI and cardiac sarcoidosis is suspected. This requires PET with F-18 FDG metabolic study combined with a PET perfusion study.
- Full body PET/CT (CPT® 78815) is not medically necessary for the diagnosis or monitoring response to therapy of cardiac sarcoidosis. It may be considered to assist in diagnosis and/or treatment options in some instances of pulmonary sarcoidosis. See **Sarcoid (CH-15.1)** in the Chest Imaging Guidelines.

Coding

Codes	Description
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)

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Codes	Description
78459	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study;

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General Information

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General Guidelines (CRID-1.0)

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Terms used in this guideline

Abbreviations

ACE inhibitor	Angiotensin-converting enzyme inhibitor
AMI	Acute myocardial infarction
ARVC	Arrhythmogenic right ventricular cardiomyopathy
AV	Atrioventricular
CC	Complications/comorbid conditions
CHF	Congestive heart failure
CM	Cardiomyopathy
CRT	Cardiac resynchronization therapy
EP	Electrophysiology
GDMT	Guideline-directed medical therapy
HCM	Hypertrophic cardiomyopathy
HFpEF	Heart Failure with Preserved Ejection Fraction
HFrEF	Heart Failure with Reduced Ejection Fraction
HV Interval	His-ventricular Interval
ICD	Implantable cardioverter defibrillator

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LBBB	Left bundle branch block
LQT	Long QT syndrome
LV	Left ventricle
LVEF	Left ventricular ejection fraction
MCC	Major complications/comorbid conditions
MI	Myocardial infarction
NCCM	Non-compaction cardiomyopathy
NYHA	New York Heart Association functional classification
OMT	Optimal medical therapy
RBBB	Right bundle branch block
RV	Right ventricle
SCA/SCD	Sudden cardiac arrest/Sudden cardiac death
TAVI	Transcatheter aortic valve implantation
TAVR	Transcatheter aortic valve replacement
VF	Ventricular fibrillation
VT	Ventricular tachycardia

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Definitions

NYHA Heart Failure Definitions	**class I** - No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnea. **class II** - Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, or dyspnea. **class III** - Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea. **class IV** - Unable to carry on any physical activity without discomfort. Symptoms of heart failure may be present even at rest. If any physical activity is undertaken, discomfort is increased.
Abnormal blood pressure response to exercise	Flat response/failure to augment; rise then fall during exercise; vasoactive cardiovascular drugs may result in an abnormal blood pressure response to exercise
Ambulatory class IV CHF	Class IV heart failure with: 1) no active acute coronary syndrome; 2) no inotropes; and 3) on OMT
Cardiomyopathy	A disease that affects the heart muscle, making it harder for the heart to pump blood to the rest of the body. It is further defined based on the type of change in the heart muscle including: • hypertrophic - muscle becomes thicker • dilated -muscle becomes weaker and stretched out • nondilated - muscle develops scarring or abnormal tissue • restrictive - muscle becomes stiff and less flexible

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Hypertrophic cardiomyopathy	Hypertrophic Cardiomyopathy (HCM) is a clinical diagnosis, established by imaging with 2D echocardiography or cardiovascular magnetic resonance (CMR) showing a maximal end-diastolic wall thickness of ≥15 mm anywhere in the left ventricle, in the absence of another cause of hypertrophy in adults. More limited hypertrophy (13–14 mm) can be diagnostic, particularly when present in family members of a patient with HCM or in conjunction with a positive genetic test, and/or associated with typical dynamic outflow obstruction, or distinctly abnormal ECG patterns.
Incessant VT	Frequent recurrences of ongoing hemodynamically stable VT
Ischemic Cardiomyopathy	Decreased ability of the heart to pump blood properly caused by damage or scarring of the heart muscle from reduced blood supply to the heart (i.e., myocardial infarction or coronary artery disease)
Long QT Syndrome (LQTS)	A congenital disorder characterized by a prolongation of the QT interval on ECG and a propensity to ventricular tachyarrhythmias, which may lead to syncope, cardiac arrest, or sudden death. The QT interval on the ECG, measured from the beginning of the QRS complex to the end of the T wave, represents the duration of activation and recovery of the ventricular myocardium. QT intervals corrected for heart rate (QTc) longer than 0.44 seconds are generally considered abnormal, though a normal QTc can be more prolonged in females (up to 0.46 sec).The Bazett formula is the formula most commonly used to calculate the QTc, as follows: QTc = AT/square root of the R-R interval (in seconds).
Non-Compaction Cardiomyopathy	A rare congenital cardiomyopathy that affects children and adults. It results from the failure of myocardial development during embryogenesis. It is also called spongiform cardiomyopathy. Symptoms are often a result of a poor pumping performance by the heart. The disease can be associated with other problems with the heart and the body.

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Non-Sustained Ventricular Tachycardia (NSVT)	Three or more consecutive ventricular beats at a rate of greater than 120 beats/min with a duration of less than 30 seconds
Nonischemic Cardiomyopathy	Decreased ability of the heart to pump blood properly not caused by coronary artery disease or ischemic injury
Optimal Medical Therapy (OMT)	Optimal medical therapy for heart failure includes 3 months of **all** of the following: • Beta-blocker • Mineralocorticoid antagonist (MRA) • One of the following: ◦ ACE inhibitor ◦ angiotensin II receptor blocker ◦ angiotensin receptor-neprilysin inhibitor **Note:** SGLT2i treatment improves prognosis in heart failure. Due to concerns over patient access, cost, and patient tolerance, although recommended for heart failure, the use is not mandatory to meet OMT. If OMT is not tolerated due to documented adverse effects (hypotension, renal dysfunction, or electrolyte imbalances) this does not preclude ICD eligibility.
Structural Heart Disease	A structural or functional abnormality of the heart, or of the blood vessels supplying the heart, that impairs its normal functioning.
Sudden Cardiac Arrest (SCA)	The abrupt loss of all heart activity
TAVR (TAVI)	A minimally invasive procedure to treat aortic valve stenosis
Wolff-Parkinson-White (WPW) syndrome	A cardiac condition where an accessory pathway allows electrical conduction between the heart chambers outside of the normal AV node route and creates a re-entry circuit, which can lead to supraventricular tachycardia (SVT), atrial fibrillation (AF), ventricular fibrillation (VF), and sudden cardiac death.

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Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

General requirements

Current clinical information, which may include history, physical examination, symptoms, laboratory results, and imaging reports, are necessary for determining the medical necessity of implantable cardiac devices.

- The information provided should have clinical relevance to the request.
- If the information provided makes no reference to the potential indication for the request, then the medical necessity for the procedure(s) cannot be supported.
- Requests for a device when a same or similar device has already been placed is not supported without clear documentation that fulfills guideline criteria.

Procedures should be requested after initial consultation and physician treatment planning that includes full counseling of the individual with shared decision-making.

Removal and replacement (CRID-1.2)

- Generator replacement (CPT® 33212, 33213, 33221, 33227, 33228, 33229, 33230, 33231, 33240, 33262, 33263, 33264, 0614T, 0801T, 0802T, 0803T) with a same or similar device is medically necessary when:
  - Interrogation shows device is nearing Elective Replacement Indicator (ERI) or End of Life (EOL).
  - Interrogation report documents the device is not functioning correctly and requires replacement.

Evidence Discussion

The decision to replace a cardiac implantable device at elective replacement indicator is shared between the individual with the implanted device and the treating physician. Because clinical situations may change, indications should be reconsidered based on the most recent guidelines to evaluate for continuance of therapy or changing the type of device. For example, currently, there insufficient data regarding ICD replacement in

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individuals who have received a primary prevention ICD, but have not experienced a clinically relevant arrhythmia since the device was placed (Russo et al. 2023). Clinical situations and an individuals understanding of their options may change. It is essential in the shared-decision process to ensure the individual is aware of any change in clinical status or change in evidence that may impact the decision to replace a cardiac device.References

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Procedure Codes Addressed in this Guideline

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Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial	33206
Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); ventricular	33207
Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial and ventricular	33208
Insertion of pacemaker pulse generator only; single existing single lead	33212
Insertion of pacemaker pulse generator only; with existing dual leads	33213
Upgrade of implanted pacemaker system, conversion of single chamber system to dual chamber system (includes removal of previously placed pulse generator, testing of existing lead, insertion of new lead, insertion of new pulse generator)	33214
Insertion of pacemaker pulse generator only; with existing multiple leads	33221
Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, with attachment to previously placed pacemaker or pacing cardioverter-defibrillator pulse generator	33224
Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, at time of insertion of pacing cardioverter-defibrillator pulse generator (including upgrade to dual chamber system and pocket revision)	33225
Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; single lead system	33227
Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; dual lead system	33228
Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; multiple lead system	33229

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Procedure description	CPT®
Insertion of pacing cardioverter-defibrillator pulse generator only; with existing dual leads	33230
Insertion of pacing cardioverter-defibrillator pulse generator only; with existing multiple leads	33231
Insertion of pacing cardioverter-defibrillator pulse generator only; with existing single leads	33240
Insertion or replacement of permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber	33249
Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; single lead system	33262
Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; dual lead system	33263
Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; multiple lead system	33264
Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters when performed	33270
Transcatheter insertion or replacement of permanent leadless pacemaker, right ventricular, including imaging guidance (e.g., fluoroscopy, venous ultrasound, ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed	33274
Transcatheter implantation of wireless pulmonary artery pressure sensor for long-term hemodynamic monitoring, including deployment and calibration of the sensor, right heart catheterization, selective pulmonary catheterization, radiological supervision and interpretation, and pulmonary artery angiography, when performed	33289

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Procedure description	CPT®
Initial open implantation of baroreflex activation therapy (BAT) modulation system, including lead placement onto the carotid sinus, lead tunneling, connection to a pulse generator placed in a distant subcutaneous pocket (ie, total system), and intraoperative interrogation and programming	64654
Insertion or replacement of permanent cardiac contractility modulation system, including contractility evaluation when performed, and programming of sensing and therapeutic parameters; pulse generator with transvenous electrodes	0408T
Insertion or replacement of permanent cardiac contractility modulation system, including contractility evaluation when performed, and programming of sensing and therapeutic parameters; pulse generator only	0409T
Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; complete system (includes electrode and generator [transmitter and battery])	0515T
Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; electrode only	0516T
Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; pulse generator component(s) (battery and/or transmitter) only	0517T
Removal and replacement of wireless cardiac stimulator for left ventricular pacing; pulse generator component(s) (battery and/or transmitter)	0519T
Removal and replacement of wireless cardiac stimulator for left ventricular pacing; pulse generator component(s) (battery and/or transmitter), including placement of a new electrode	0520T
Insertion or replacement of implantable cardioverter-defibrillator system with substernal electrode(s), including all imaging guidance and electrophysiological evaluation (includes defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters), when performed	0571T

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Procedure description	CPT®
Removal and replacement of substernal implantable defibrillator pulse generator	0614T
Transcatheter insertion of permanent dual-chamber leadless pacemaker, including imaging guidance (e.g., fluoroscopy, venous ultrasound, right atrial angiography, right ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed; complete system (i.e., right atrial and right ventricular pacemaker components)	0795T
Transcatheter insertion of right atrial pacemaker component (when an existing right ventricular single leadless pacemaker exists to create a dual-chamber leadless pacemaker system)	0796T
Transcatheter insertion of right ventricular pacemaker component (when part of a dual-chamber leadless pacemaker system)	0797T
Transcatheter removal and replacement of permanent dual-chamber leadless pacemaker, including imaging#guidance (e.g., fluoroscopy, venous ultrasound, right atrial angiography, right ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed; dual-chamber system (i.e., right atrial and right ventricular pacemaker components)	0801T
Transcatheter removal and replacement of right atrial pacemaker component	0802T
Transcatheter removal and replacement of right ventricular pacemaker component (when part of a dual-chamber leadless pacemaker system)	0803T
Transcatheter insertion of permanent single-chamber leadless pacemaker, right atrial, including imaging guidance (e.g., fluoroscopy, venous ultrasound, right atrial angiography and/or right ventriculography, femoral venography, cavography) and device evaluation (e.g., interrogation or programming), when performed	0823T
Transcatheter removal and replacement of permanent single-chamber leadless pacemaker, right atrial, including imaging guidance (e.g., fluoroscopy, venous ultrasound, right atrial angiography and/or right ventriculography, femoral venography, cavography) and device evaluation (e.g., interrogation or programming), when performed	0825T

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Procedure description	CPT®
Insertion of permanent cardiac contractility modulation-defibrillation system component(s), including fluoroscopic guidance, and evaluation and programming of sensing and therapeutic parameters; pulse generator and dual transvenous electrodes/leads (pacing and defibrillation)	0915T
Insertion of permanent cardiac contractility modulation-defibrillation system component pulse generator only	0916T
Removal and replacement of permanent cardiac contractility modulation defibrillation pulse generator only	0923T
Transcatheter implantation of wireless left atrial pressure sensor for long-term left atrial pressure monitoring, including sensor calibration and deployment, right heart catheterization, transseptal puncture, imaging guidance, and radiological supervision and interpretation	0933T

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Pacemaker Devices

Guideline

Permanent Pacemaker Implantation (CRID-7)
References
Leadless Pacemaker (CRID-11.1)
References

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Permanent Pacemaker Implantation (CRID-7)

CID.PM.107.A
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Codes included

Description	CPT®
Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial	33206
Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); ventricular	33207
Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial and ventricular	33208
Upgrade of implanted pacemaker system, conversion of single chamber system to dual chamber system (includes removal of previously placed pulse generator, testing of existing lead, insertion of new lead, insertion of new pulse generator)	33214

Indications for Permanent Pacemaker (CRID-7.1)

Sinus node dysfunction

Permanent pacemaker implantation is medically necessary for any of the following:

- Symptomatic non-reversible sinus node dysfunction as evidenced by **both** of the following:
  - Documented sinus node dysfunction including one of the below:
    - Sinus bradycardia at rate less than 50 beats per minute
    - Sinus pauses greater than 3 seconds
  - Symptoms attributable to non-reversible sinus node dysfunction including **one** of the below:
    - Syncope or pre-syncope
    - Heart failure symptoms
    - Exertional fatigue and impaired exercise tolerance

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- Sinus bradycardia at rate less than 40 beats per minute and symptoms possibly related to bradycardia
- Symptomatic sinus bradycardia (as defined above) is a consequence of essential medical management and continued treatment is clinically necessary
- Symptoms attributable to bradycardia as listed above and evidence of tachy-brady syndrome (sinus bradycardia, ectopic atrial bradycardia, or sinus pause alternating with periods of atrial flutter or atrial fibrillation)
- Symptomatic chronotropic incompetence defined as limitations in activity due to the inability of the heart to increase its rate during exercise to achieve 80% of maximum predicted heart rate (220-age).

Atrioventricular block (AVB)

Permanent pacemaker implantation is medically necessary for any of the following:

- AVB including one of the below, with or without symptoms:
  - Second-degree Mobitz type II
  - High-grade (greater than or equal to 2 consecutive P waves at a constant physiologic rate that do not conduct to the ventricles)
  - Third-degree (complete heart block)
- Any degree of AVB with one of the following symptoms that are clearly attributable to the AVB:
  - Syncope or pre-syncope
  - Heart failure symptoms
  - Exertional fatigue and impaired exercise tolerance
- Third-degree and advanced second-degree AV block at any anatomic level associated with sustained or non-sustained ventricular tachycardia (ventricular rhythm at rate greater than 100 bpm lasting greater than or equal to 3 consecutive beats) presumed due to AV block
- Marked first-degree AVB (PR interval greater than or equal to 0.3 seconds) or second-degree AVB with symptoms similar to those of pacemaker syndrome
- Symptomatic AVB as a consequence of guideline directed management and continued treatment is clinically necessary
- Persistent or permanent atrial fibrillation and symptomatic bradycardia including one of the following:
  - Rate less than 50 beats per minute
  - Regular QRS intervals indicating complete atrioventricular block (AVB)
- Second degree AV block with a documented pause of greater than or equal to 5 seconds during waking in the presence of atrial fibrillation, with or without symptoms
- Second degree AV block with documented periods of asystole greater than or equal to 3.0 seconds in the presence of sinus rhythm, with or without symptoms

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- Second-degree AVB noted to be located at intra-His or infra-His levels at electrophysiology study (EPS), with or without symptoms
- Any AVB indication listed above occurring after acute myocardial infarction that does not resolve within 5 days
- Congenital complete or high-degree AVB in the presence of any of the following:
  - Symptoms related to bradycardia such as syncope, pre-syncope, heart failure symptoms, exertional fatigue, or impaired exercise tolerance
  - Wide QRS escape rhythm
  - Mean daytime heart rate below 50 bpm
  - Pauses greater than 3 times the cycle length of the ventricular escape rhythm
  - Complex ventricular ectopy
  - Prolonged QT interval
  - Ventricular dysfunction, ventricular dilatation or significant mitral regurgitation

Conduction Disorders with 1:1 Atrioventricular Conduction

Permanent pacemaker implantation is medically necessary for any of the following:

- Individuals with syncope and bundle branch block and one of the following at electrophysiology study (EPS):
  - Baseline HV interval greater than or equal to 70 ms
  - Second- or third-degree intra- or infra-Hisian block during incremental atrial pacing
- Alternating bundle branch block, with or without symptoms
- HV interval greater than or equal to 100 milliseconds noted at EPS, with or without symptoms
- Intra-Hisian- or infra-Hisian block noted at EPS, with or without symptoms

Recurrent syncope

Permanent pacemaker implantation is medically necessary for individuals with recurrent syncope and any of the following:

- Spontaneous documented symptomatic asystolic pause greater than 3 seconds due to sinus arrest or atrioventricular block (AVB)
- Spontaneous documented asymptomatic asystolic pause greater than 6 seconds due to sinus arrest or AVB
- Cardioinhibitory carotid sinus syndrome as documented by one of the below:
  - Syncope caused by spontaneously occurring carotid sinus stimulation
  - Carotid sinus pressure that induces syncope and/or ventricular asystole of greater than or equal to 3 seconds
- Syncope associated with asystole of greater than or equal to 3 seconds during tilt testing

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- Bundle branch block and one of the following at electrophysiology study (EPS):
  - Baseline HV interval greater than or equal to 70 ms
  - Second- or third-degree intra- or infra-Hisian block during incremental atrial pacing
- Syncope after cardiac transplantation with or without documentation of bradyarrhythmia
- Recurrent Adam-Stokes syndrome

Peri-procedural and post-operative indications

Permanent pacemaker implantation is medically necessary for any of the following:

- Prior to a planned catheter ablation of the atrioventricular (AV) junction for one of the following:
  - Rate control strategy for management of atrial fibrillation
  - Supraventricular tachycardia resulting in tachycardia induced cardiomyopathy that is not controlled with ablation or medical therapy
- Post Transcatheter Aortic Valve Implantation (TAVI) for any of the following:
  - Complete or high-degree atrioventricular block (AVB) that persists for 24 to 48 hours after TAVI
  - New-onset alternating bundle branch block after TAVI
  - Pre-existing right bundle branch block (RBBB) and new conduction abnormality onset during or after (TAVI) such as:
    - Transient high-degree AVB
    - PR prolongation
    - QRS axis change
- Sinus node dysfunction or AVB associated with symptoms or hemodynamic instability occurring after cardiac surgery that does not resolve within 5 days
- Post cardiac transplant for any of the following:
  - Relative bradycardia that is prolonged or recurrent, which limits rehabilitation or discharge after postoperative recovery
  - Syncope with or without documentation of bradyarrhythmia

Neuromuscular diseases known to involve the heart

Permanent pacemaker implantation is considered medically necessary for progressive neuromuscular diseases known to involve the heart with any degree of atrioventricular (AV) block including first degree AV block or any fascicular block, with or without symptoms, because there may be unpredictable progression of AV conduction disease. Progressive neuromuscular diseases known to involve the heart include:

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- Myotonic muscular dystrophy
- Kearns-Sayre syndrome
- Erb dystrophy (limb-girdle muscular dystrophy)
- Peroneal muscular atrophy

Single Chamber Pacemaker Upgrade to Dual Chamber Pacemaker

Upgrade of a single-chamber ventricular pacemaker (VVI) to dual-chamber pacemaker (DDD) is medically necessary when **any** of the following conditions are present:

- Sinus node dysfunction, where atrial pacing is required to maintain chronotropic competence
- Atrioventricular (AV) conduction abnormalities, including first-degree, second-degree (Mobitz I or II), high-grade AV block, or complete heart block, where synchronized atrioventricular pacing is anticipated to improve hemodynamic performance
- Symptoms consistent with pacemaker syndrome (fatigue, hypotension, or syncope resulting from the loss of AV synchrony)

Permanent Pacemaker Implantation - Non-indications (CRID-7.2)

- Permanent pacemaker implantation is **not** medically necessary in any of the following settings:
  - Sinus node dysfunction when there is documentation of any of the following
    - Individual is asymptomatic
    - The symptoms suggestive of bradycardia have been clearly documented to occur in the absence of bradycardia
    - Sinus node dysfunction is due to nonessential drug therapy
  - Fascicular block without AV block or without symptoms concerning for AV block
  - Incidentally noted hypersensitive cardioinhibitory response to carotid sinus stimulation when the individual remains asymptomatic or has vague symptoms
  - Asymptomatic first-degree AV block
  - Asymptomatic type-1 second-degree AV block at the supra-His (AV node) level or that which is not known to be intra- or infra-Hisian
  - Asymptomatic transient AV block in the absence of intraventricular conduction defects or in isolated single fascicular block
  - Situational vasovagal syncope when avoidance behavior is effectively preventing syncopal episodes
  - Prior to Transcatheter Aortic Valve Replacement (TAVR) as a prophylactic measure in individuals with right bundle branch block (RBBB) when there is no indication for permanent pacing
  - For the purpose of cardiac contractility modulation (CCM)

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- Upgrade of a single chamber pacemaker (VVI) to a dual chamber pacemaker (DDD) is **not** medically necessary for the indication of persistent atrial fibrillation when it is **not** part of a planned rhythm control strategy.

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Leadless Pacemaker (CRID-11.1)

CID.PM.111.A
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Codes included

Description	CPT®
Transcatheter insertion of permanent dual-chamber leadless pacemaker, including imaging guidance (e.g., fluoroscopy, venous ultrasound, right atrial angiography, right ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed; complete system (i.e., right atrial and right ventricular pacemaker components)	0795T
Transcatheter insertion of right atrial pacemaker component (when an existing right ventricular single leadless pacemaker exists to create a dual-chamber leadless pacemaker system)	0796T
Transcatheter insertion of right ventricular pacemaker component (when part of a dual-chamber leadless pacemaker system)	0797T
Transcatheter insertion of permanent single-chamber leadless pacemaker, right atrial, including imaging guidance (e.g., fluoroscopy, venous ultrasound, right atrial angiography and/or right ventriculography, femoral venography, cavography) and device evaluation (e.g., interrogation or programming), when performed	0823T
Transcatheter insertion or replacement of permanent leadless pacemaker, right ventricular, including imaging guidance (e.g., fluoroscopy, venous ultrasound, ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed	33274

Indications for Leadless Pacemaker

Leadless right ventricular pacemaker (CRID-11.1.1)

CPT® 33274

Permanent right ventricular leadless pacemaker implant is medically necessary when **both** of the following are met:

- The individual meets **any** of the following indications for leadless right ventricular pacemaker:

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  - Symptomatic paroxysmal or permanent high-grade AV block in the presence of Atrial Fibrillation (AF)
  - Symptomatic paroxysmal or permanent high-grade AV block in the absence of AF, as an alternative to dual chamber pacing, when atrial lead placement is considered difficult, high risk, or not deemed necessary for effective therapy
  - Symptomatic bradycardia-tachycardia syndrome or sinus node dysfunction (sinus bradycardia or sinus pauses), as an alternative to atrial or dual chamber pacing, when atrial lead placement is considered difficult, high risk, or not deemed necessary for effective therapy
- The following contraindications for leadless pacemaker are **not** present:
  - An implanted inferior vena cava filter
  - A mechanical tricuspid valve

Leadless dual chamber pacemaker system (CRID-11.1.2)

CPT® 0795T

A leadless dual chamber pacemaker is considered not medically necessary when either of the following **contraindications** is present:
- An implanted inferior vena cava filter
- A mechanical tricuspid valve

Permanent dual chamber leadless pacemaker implant is medically necessary in an individual with no contraindications to a leadless pacemaker, when one of the following indications for a permanent dual chamber pacemaker is documented:

Sinus node dysfunction

Permanent pacemaker implantation is medically necessary for any of the following:
- Symptomatic non-reversible sinus node dysfunction as evidenced by **both** of the following:
  - Documented sinus node dysfunction including one of the below:
    - Sinus bradycardia at rate less than 50 beats per minute
    - Sinus pauses greater than 3 seconds
  - Symptoms attributable to non-reversible sinus node dysfunction including **one** of the below:
    - Syncope or pre-syncope
    - Heart failure symptoms
    - Exertional fatigue and impaired exercise tolerance
- Sinus bradycardia at rate less than 40 beats per minute and symptoms possibly related to bradycardia
- Symptomatic sinus bradycardia (as defined above) is a consequence of essential medical management and continued treatment is clinically necessary

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- Symptoms attributable to bradycardia as listed above and evidence of tachy-brady syndrome (sinus bradycardia, ectopic atrial bradycardia, or sinus pause alternating with periods of atrial flutter or atrial fibrillation)
- Symptomatic chronotropic incompetence defined as limitations in activity due to the inability of the heart to increase its rate during exercise to achieve 80% of maximum predicted heart rate (220-age).

Atrioventricular block (AVB)

Permanent pacemaker implantation is medically necessary for any of the following:

- AVB including one of the below, with or without symptoms:
  - Second-degree Mobitz type II
  - High-grade (greater than or equal to 2 consecutive P waves at a constant physiologic rate that do not conduct to the ventricles)
  - Third-degree (complete heart block)
- Any degree of AVB with one of the following symptoms that are clearly attributable to the AVB:
  - Syncope or pre-syncope
  - Heart failure symptoms
  - Exertional fatigue and impaired exercise tolerance
- Third-degree and advanced second-degree AV block at any anatomic level associated with sustained or non-sustained ventricular tachycardia (ventricular rhythm at rate greater than 100 bpm lasting greater than or equal to 3 consecutive beats) presumed due to AV block
- Marked first-degree AVB (PR interval greater than or equal to 0.3 seconds) or second-degree AVB with symptoms similar to those of pacemaker syndrome
- Symptomatic AVB as a consequence of guideline directed management and continued treatment is clinically necessary
- When part of a planned rhythm control strategy, persistent atrial fibrillation with symptomatic bradycardia including **either** of the following:
  - Rate less than 50 beats per minute
  - Regular QRS intervals indicating complete atrioventricular block (AVB)
- Second degree AV block with a documented pause of greater than or equal to 5 seconds during waking in the presence of atrial fibrillation, with or without symptoms
- Second degree AV block with documented periods of asystole greater than or equal to 3.0 seconds in the presence of sinus rhythm, with or without symptoms
- Second-degree AVB noted to be located at intra- or infra-His levels at electrophysiology study (EPS), with or without symptoms
- Any AVB indication listed above occurring after acute myocardial infarction that does not resolve within 5 days

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- Congenital complete or high-degree AVB in the presence of any of the following:
  - Symptoms related to bradycardia such as syncope, pre-syncope, heart failure symptoms, exertional fatigue, or impaired exercise tolerance
  - Wide QRS escape rhythm
  - Mean daytime heart rate below 50 bpm
  - Pauses greater than 3 times the cycle length of the ventricular escape rhythm
  - Complex ventricular ectopy
  - Prolonged QT interval
  - Ventricular dysfunction, ventricular dilatation or significant mitral regurgitation

Conduction Disorders with 1:1 Atrioventricular Conduction

Permanent pacemaker implantation is medically necessary for any of the following:

- Individuals with syncope and bundle branch block and one of the following at electrophysiology study (EPS):
  - Baseline HV interval greater than or equal to 70 ms
  - Second- or third-degree intra- or infra-Hisian block during incremental atrial pacing
- Alternating bundle branch block, with or without symptoms
- HV interval greater than or equal to 100 milliseconds noted at EPS, with or without symptoms
- Intra-Hisian- or infra-Hisian block noted at EPS, with or without symptoms

Recurrent syncope

Permanent pacemaker implantation is medically necessary for individuals with recurrent syncope and any of the following:

- Spontaneous documented symptomatic asystolic pause greater than 3 seconds due to sinus arrest or atrioventricular block (AVB)
- Spontaneous documented asymptomatic asystolic pause greater than 6 seconds due to sinus arrest or AVB
- Cardioinhibitory carotid sinus syndrome as documented by one of the below:
  - Syncope caused by spontaneously occurring carotid sinus stimulation
  - Carotid sinus pressure that induces syncope and/or ventricular asystole of greater than or equal to 3 seconds
- Syncope associated with asystole of greater than or equal to 3 seconds during tilt testing
- Bundle branch block and one of the following at electrophysiology study (EPS):
  - Baseline HV interval greater than or equal to 70 ms

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  - Second- or third-degree intra- or infra-Hisian block during incremental atrial pacing
- Syncope after cardiac transplantation with or without documentation of bradyarrhythmia
- Recurrent Adam-Stokes syndrome

Peri-procedural and post-operative indications

Permanent pacemaker implantation is medically necessary for any of the following:

- Prior to a planned catheter ablation of the atrioventricular (AV) junction for supraventricular tachycardia resulting in tachycardia induced cardiomyopathy that is not controlled with ablation or medical therapy
- Post Transcatheter Aortic Valve Implantation (TAVI) for any of the following:
  - Complete or high-degree atrioventricular block (AVB) that persists for 24 to 48 hours after TAVI
  - New-onset alternating bundle branch block after TAVI
  - Pre-existing right bundle branch block (RBBB) and new conduction abnormality onset during or after (TAVI) such as:
    - Transient high-degree AVB
    - PR prolongation
    - QRS axis change
- Sinus node dysfunction or AVB associated with symptoms or hemodynamic instability occurring after cardiac surgery that does not resolve within 5 days
- Post cardiac transplant for any of the following:
  - Relative bradycardia that is prolonged or recurrent, which limits rehabilitation or discharge after postoperative recovery
  - Syncope with or without documentation of bradyarrhythmia

Neuromuscular diseases known to involve the heart

Permanent pacemaker implantation is considered medically necessary for progressive neuromuscular diseases known to involve the heart with any degree of atrioventricular (AV) block including first degree AV block or any fascicular block, with or without symptoms, because there may be unpredictable progression of AV conduction disease. Progressive neuromuscular diseases known to involve the heart include:

- Myotonic muscular dystrophy
- Kearns-Sayre syndrome
- Erb dystrophy (limb-girdle muscular dystrophy)
- Peroneal muscular atrophy

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Leadless right atrial pacemaker (CRID-11.1.3)

CPT® 0823T

Permanent leadless right atrial pacemaker implant is medically necessary when **both** of the following are met:

- Symptomatic sinus node dysfunction (dizziness, syncope, shortness of breath) with normal AV and intraventricular conduction systems
- The following contraindications for leadless pacemaker are not present:
  - An implanted inferior vena cava filter
  - A mechanical tricuspid valve

General information

Right ventricular leadless pacemaker

The permanent right ventricular leadless pacemakers (CPT® 33274) consist of a single leadless device implanted directly into the right ventricle. The Medtronic Micra™ VR and Abbott Aveir™ VR right ventricular leadless pacemakers are capable only of VVI and VVIR pacing. The Medtronic Micra™ AV right ventricular leadless pacemaker is also capable of VDD pacing. The right ventricular leadless pacemakers do not have capability for atrial pacing. The estimated battery life is about 10 years

Dual chamber leadless pacemaker

In contrast to the right ventricular leadless pacemakers referred to above, the dual chamber leadless pacemaker (i.e., Abbott Aveir™ DR leadless pacemaker system) has dual-chamber sensing and pacing functionality. The Abbott Aveir™ DR leadless pacemaker system consists of two separate components: one implanted in the right atrium and the other in the right ventricle.

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Implantable Cardioverter-Defibrillator (ICD) Devices

Guideline

Indications for ICD implantation (CRID-2)
References
Pediatric Implantable Cardioverter Defibrillator
References

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Indications for ICD implantation (CRID-2)

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Codes included

Description	CPT®
Insertion or replacement of permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber	33249
Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters when performed	33270

Secondary Prevention ICD indications (CRID-2.1)

Cardiac Arrest Survivors (CRID-2.1.1)

ICD implantation is medically necessary in a survivor of cardiac arrest in the setting of any of the following conditions:

- Cardiac arrest from hemodynamically unstable or sustained VT, polymorphic VT, or VF associated with an acute (less than 48 Hours) MI with **both** of the following conditions:
  - Obstructive CAD with coronary anatomy not amenable to revascularization
  - Ejection fraction less than or equal to 35%
- Cardiac arrest from hemodynamically unstable or sustained VT, polymorphic VT, or VF associated with acute (<48 hours) post-coronary revascularization when **both** of the following conditions exist:
  - No evidence for acute coronary occlusion, restenosis, acute infarct, or other clearly reversible cause
  - Ejection fraction is less than or equal to 35%
- Cardiac arrest from hemodynamically unstable or sustained VT, polymorphic VT, or VF associated with coronary artery disease with **both** of the following conditions:
  - No recent MI (less than or equal to 40 days) prior to arrest
  - No recent coronary revascularization (less than or equal to 3 months) prior to arrest

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- Cardiac arrest from hemodynamically unstable or sustained VT, polymorphic VT, or VF during exercise testing when cardiac catheterization performed after the arrest results in **any** of the following:
  - Significant CAD not amenable to revascularization
  - Significant CAD identified and complete revascularization performed
  - Significant CAD identified and incomplete revascularization performed
- Cardiac arrest from hemodynamically unstable or sustained VT, polymorphic VT, or VF not associated with coronary artery disease in the setting of **any** of the following conditions:
  - Non-ischemic dilated cardiomyopathy
  - Myocardial sarcoidosis
  - Giant-cell myocarditis
- Cardiac arrest with idiopathic VF and a normal Ejection Fraction (greater than or equal to 50%) when no reversible causes have been identified including **all** of the following:
  - Pharmacologically induced sustained VT/VF
  - Sustained VT/VF with hypokalemia
  - Wolff-Parkinson-White (WPW) syndrome with VT/VF and successfully ablated pathway

Sustained VT/VF (CRID-2.1.2)

ICD implantation is medically necessary to treat an individual with sustained VT or VF in the setting of any of the following conditions:

- Sustained VT/VF with any of the following genetic diseases:
  - Congenital long QT syndrome
  - Short QT syndrome
  - Catecholaminergic polymorphic VT
  - Brugada syndrome
  - Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)
  - Hypertrophic cardiomyopathy
- Sustained hemodynamically stable monomorphic VT associated with **non-ischemic** dilated cardiomyopathy when **any** of the following conditions apply:
  - No ablation was performed
  - Ablation did not result in successful termination of all inducible VTs
  - All inducible VTs were successfully ablated and LVEF is less than or equal to 50%
  - Identified bundle branch re-entry was successfully ablated and LVEF is less than or equal to 35%

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- Sustained hemodynamically stable monomorphic VT associated with **ischemic** structural heart disease (coronary artery disease with prior MI) when **any** of the following apply:
  - No ablation was performed
  - Ablation did not result in successful termination of all inducible VTs
  - All inducible VTs are successfully ablated and LVEF is less than or equal to 35%
  - Ejection fraction is less than or equal to 35%

Syncope (CRID-2.1.3)

ICD implantation is medically necessary to treat unexplained syncope in an individual with any of the following conditions:

- Long QT syndrome in an individual on beta blocker therapy
- Brugada pattern on ECG
- Catecholaminergic polymorphic VT in an individual on a beta blocker
- Coronary artery disease with a prior MI in the setting of **either** of the following:
  - LVEF 36%-49% and both of the following:
    - No Acute MI (less than or equal to 40 days)
    - Inducible sustained VT/VF on EP study
  - Ejection fraction less than or equal to 35%
- Non-ischemic structural heart disease and any of the following:
  - Left ventricular hypertrophy (LVH) with EF less than or equal to 35%
  - Non-ischemic dilated cardiomyopathy with ejection fraction less than or equal to 35%
  - Left ventricular non-compaction with ejection fraction less than 50%
  - Tetralogy of Fallot with prior corrective surgery
  - Hypertrophic cardiomyopathy
  - Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)

Evidence Discussion

Secondary prevention refers to an indication for an ICD exclusively for patients who have survived >1 cardiac arrest(s) or episode(s) of sustained VT or VF. A ventricular arrhythmia is considered sustained if it lasts >30 seconds or result in hemodynamically significant symptoms prior to that time (i.e., requiring cardioversion or defibrillation). Patients with cardiac conditions associated with a high risk of sudden cardiac death (SCD) who have unexplained syncope presumed to be the result of a self-terminating ventricular arrhythmia are also considered to have a secondary prevention indication.

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Primary Prevention ICD Indications (CRID-2.2)

Ischemic Cardiomyopathy (CRID-2.2.1)

Primary prevention is an indication for an ICD to prevent SCD. It refers to use of ICDs in individuals who are at risk for, but have not yet had, an episode of sustained VT, VF, or cardiac arrest.

ICD implantation is medically necessary for primary prevention of sudden cardiac death (SCD) associated with ischemic cardiomyopathy in the setting of **any** of the following:

- Post-acute MI (less than or equal to 40 Days) with LVEF less than or equal to 30% in the setting of either of the following:
  - Complete revascularization after recent MI with PCI or CABG and **all** of the following:
    - Asymptomatic NSVT (greater than or equal to 4 days post-MI)
    - EPS with inducible VT
    - EPS performed after revascularization and less than 40 day post MI
  - Obstructive CAD not amenable to revascularization with **both** of the following:
    - Asymptomatic NSVT (greater than or equal to 4 days post-MI)
    - EPS with inducible sustained VT (EPS performed within 40 days of MI)
- Post-acute MI (less than or equal to 40 Days) LVEF 31% to 40% when all of the following apply:
  - Asymptomatic NSVT (greater than or equal to 4 days post-MI)
  - EPS with inducible sustained VT (if revascularized, EPS performed after revascularization, within 40 days of MI)
- Post-acute MI (less than or equal to 40 Days) and Pre-Existing Chronic Cardiomyopathy (greater than or equal to 3 Months) with any of the following:
  - LVEF less than or equal to 30% due to old infarction with functional class I-III
  - LVEF less than or equal to 35% with NYHA functional class II-III
- Post MI (greater than 40 Days) with any of the following conditions:
  - LVEF less than or equal to 35% and both:
    - NYHA functional class I, II, or III
    - No PCI/CABG within 3 months
  - LVEF 36%-40% with all of the following:
    - No PCI/CABG within 3 months
    - Asymptomatic NSVT
    - EPS with inducible sustained VT
  - PCI or CABG (less than or equal to 3 Months) with LVEF less than or equal to 35% on OMT for greater than or equal to 3 months prior to PCI/CABG

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- Ischemic cardiomyopathy with LVEF less than or equal to 35% and either of the following:
  - Individual has completed greater than or equal to 3 months of **OMT**
  - Individual has completed less than 3 months of **OMT** with either of the following findings:
    - NSVT
    - EPS with inducible sustained VT

Post Myocardial Infarction (MI) Need for Pacemaker Therapy (CRID-2.2.2)

ICD implantation is considered medically necessary in individuals with ischemic cardiomyopathy and a need for post-MI pacemaker therapy when **both** of the following clinical conditions exist:

- LVEF less than or equal to 35% in the setting of **either** of the following:
  - Individual is post-acute MI (less than or equal to 40 Days)
  - Individual is post MI (greater than 40 Days) with PCI or CABG (greater than or equal to 3 Months)
- **Any** of the following indications for pacemaker exist:

Sinus node dysfunction

Permanent pacemaker implantation is medically necessary for any of the following:

- Symptomatic non-reversible sinus node dysfunction as evidenced by **both** of the following:
  - Documented sinus node dysfunction including one of the below:
    - Sinus bradycardia at rate less than 50 beats per minute
    - Sinus pauses greater than 3 seconds
  - Symptoms attributable to non-reversible sinus node dysfunction including **one** of the below:
    - Syncope or pre-syncope
    - Heart failure symptoms
    - Exertional fatigue and impaired exercise tolerance
- Sinus bradycardia at rate less than 40 beats per minute and symptoms possibly related to bradycardia
- Symptomatic sinus bradycardia (as defined above) is a consequence of essential medical management and continued treatment is clinically necessary
- Symptoms attributable to bradycardia as listed above and evidence of tachy-brady syndrome (sinus bradycardia, ectopic atrial bradycardia, or sinus pause alternating with periods of atrial flutter or atrial fibrillation)

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- Symptomatic chronotropic incompetence defined as limitations in activity due to the inability of the heart to increase its rate during exercise to achieve 80% of maximum predicted heart rate (220-age).

Atrioventricular block (AVB)

Permanent pacemaker implantation is medically necessary for any of the following:

- AVB including one of the below, with or without symptoms:
  - Second-degree Mobitz type II
  - High-grade (greater than or equal to 2 consecutive P waves at a constant physiologic rate that do not conduct to the ventricles)
  - Third-degree (complete heart block)
- Any degree of AVB with one of the following symptoms that are clearly attributable to the AVB:
  - Syncope or pre-syncope
  - Heart failure symptoms
  - Exertional fatigue and impaired exercise tolerance
- Third-degree and advanced second-degree AV block at any anatomic level associated with sustained or non-sustained ventricular tachycardia (ventricular rhythm at rate greater than 100 bpm lasting greater than or equal to 3 consecutive beats) presumed due to AV block
- Marked first-degree AVB (PR interval greater than or equal to 0.3 seconds) or second-degree AVB with symptoms similar to those of pacemaker syndrome
- Symptomatic AVB as a consequence of guideline directed management and continued treatment is clinically necessary
- Persistent or permanent atrial fibrillation and symptomatic bradycardia including one of the following:
  - Rate less than 50 beats per minute
  - Regular QRS intervals indicating complete atrioventricular block (AVB)
- Second degree AV block with a documented pause of greater than or equal to 5 seconds during waking in the presence of atrial fibrillation, with or without symptoms
- Second degree AV block with documented periods of asystole greater than or equal to 3.0 seconds in the presence of sinus rhythm, with or without symptoms
- Second-degree AVB noted to be located at intra-His or infra-His levels at electrophysiology study (EPS), with or without symptoms
- Any AVB indication listed above occurring after acute myocardial infarction that does not resolve within 5 days
- Congenital complete or high-degree AVB in the presence of any of the following:
  - Symptoms related to bradycardia such as syncope, pre-syncope, heart failure symptoms, exertional fatigue, or impaired exercise tolerance

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- Wide QRS escape rhythm
- Mean daytime heart rate below 50 bpm
- Pauses greater than 3 times the cycle length of the ventricular escape rhythm
- Complex ventricular ectopy
- Prolonged QT interval
- Ventricular dysfunction, ventricular dilatation or significant mitral regurgitation

Conduction Disorders with 1:1 Atrioventricular Conduction

Permanent pacemaker implantation is medically necessary for any of the following:

- Individuals with syncope and bundle branch block and one of the following at electrophysiology study (EPS):
  - Baseline HV interval greater than or equal to 70 ms
  - Second- or third-degree intra- or infra-Hisian block during incremental atrial pacing
- Alternating bundle branch block, with or without symptoms
- HV interval greater than or equal to 100 milliseconds noted at EPS, with or without symptoms
- Intra-Hisian- or infra-Hisian block noted at EPS, with or without symptoms

Recurrent syncope

Permanent pacemaker implantation is medically necessary for individuals with recurrent syncope and any of the following:

- Spontaneous documented symptomatic asystolic pause greater than 3 seconds due to sinus arrest or atrioventricular block (AVB)
- Spontaneous documented asymptomatic asystolic pause greater than 6 seconds due to sinus arrest or AVB
- Cardioinhibitory carotid sinus syndrome as documented by one of the below:
  - Syncope caused by spontaneously occurring carotid sinus stimulation
  - Carotid sinus pressure that induces syncope and/or ventricular asystole of greater than or equal to 3 seconds
- Syncope associated with asystole of greater than or equal to 3 seconds during tilt testing
- Bundle branch block and one of the following at electrophysiology study (EPS):
  - Baseline HV interval greater than or equal to 70 ms
  - Second- or third-degree intra- or infra-Hisian block during incremental atrial pacing
- Syncope after cardiac transplantation with or without documentation of bradyarrhythmia

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- Recurrent Adam-Stokes syndrome

Peri-procedural and post-operative indications

Permanent pacemaker implantation is medically necessary for any of the following:

- Prior to a planned catheter ablation of the atrioventricular (AV) junction for one of the following:
  - Rate control strategy for management of atrial fibrillation
  - Supraventricular tachycardia resulting in tachycardia induced cardiomyopathy that is not controlled with ablation or medical therapy
- Post Transcatheter Aortic Valve Implantation (TAVI) for any of the following:
  - Complete or high-degree atrioventricular block (AVB) that persists for 24 to 48 hours after TAVI
  - New-onset alternating bundle branch block after TAVI
  - Pre-existing right bundle branch block (RBBB) and new conduction abnormality onset during or after (TAVI) such as:
    - Transient high-degree AVB
    - PR prolongation
    - QRS axis change
- Sinus node dysfunction or AVB associated with symptoms or hemodynamic instability occurring after cardiac surgery that does not resolve within 5 days
- Post cardiac transplant for any of the following:
  - Relative bradycardia that is prolonged or recurrent, which limits rehabilitation or discharge after postoperative recovery
  - Syncope with or without documentation of bradyarrhythmia

Neuromuscular diseases known to involve the heart

Permanent pacemaker implantation is considered medically necessary for progressive neuromuscular diseases known to involve the heart with any degree of atrioventricular (AV) block including first degree AV block or any fascicular block, with or without symptoms, because there may be unpredictable progression of AV conduction disease. Progressive neuromuscular diseases known to involve the heart include:

- Myotonic muscular dystrophy
- Kearns-Sayre syndrome
- Erb dystrophy (limb-girdle muscular dystrophy)
- Peroneal muscular atrophy

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Non-ischemic Cardiomyopathy (CRID-2.2.3)

ICD implantation is medically necessary for primary prevention of SCD associated with non-ischemic cardiomyopathy in the setting of **any** of the following conditions:

- Idiopathic non-ischemic cardiomyopathy when **all** of the following apply:
  - LVEF less than or equal to 35% after greater than or equal to 3 months of **OMT**
  - Age less than or equal to 85 years
  - Functional NYHA class I-III
- Non-ischemic cardiomyopathy with recent valve surgery or TAVR with **all** of the following:
  - Recent Valve surgery or TAVR (within 3 months)
  - LVEF less than or equal to 35%
  - Need for pacemaker and LV function felt not likely to improve
- Non-ischemic cardiomyopathy from other specific etiologies in the setting of **any** of the following conditions:
  - Giant-cell myocarditis regardless of the LVEF
  - Sarcoid heart disease when LVEF is less than or equal to 35%
  - Myotonic dystrophy when LVEF is less than or equal to 35%
  - Chagas disease when LVEF is less than or equal to 35%
- Peripartum cardiomyopathy when **both** of the following apply:
  - Individual has completed 3 or more months of OMT
  - LVEF of 35% or less is persistent for 3 or more months post-partum
- **Any** of the following genetic conditions with structural heart disease:
  - Hypertrophic cardiomyopathy with **1 or more** of the following risk factor(s):
    - LV wall thickness greater than or equal to 30mm
    - SCD in 1 or more first-degree relatives presumably caused by HCM
    - 1 or more episodes of unexplained syncope within the preceding 6 months
    - Spontaneous NSVT
    - Abnormal blood pressure response with exercise
  - Arrhythmogenic right ventricular dysplasia/CM
  - Evidence of structural cardiac disease with Lamin A/C mutation or other genetic ACM with LVEF less than or equal to 45%
- **Either** of the following genetic conditions without structural heart disease:
  - Catecholaminergic Polymorphic VT with **both** of the following:
    - Non-sustained VT
    - one of the following:
      - Not tolerating medical therapy (beta-blockers, flecainide, or propafenone)
      - Breakthrough non-sustained ventricular arrhythmia on medical therapy (beta-blockers, flecainide, or propafenone)
  - Brugada by ECG (Type I ECG Pattern) with inducible VT or VF at EPS

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Pre or Post Heart Transplant (CRID-2.2.4)

ICD implantation is medically necessary for primary prevention of SCD for **either** of the following indications:

- Individual is on waiting list for heart transplant (outpatient status)
- Individual is post heart transplant with multiple episodes of cellular or antibody-mediated rejection

ICD Non-indications (CRID-2.7)

Non-indications

ICD implantation is considered **not medically necessary** in any of the following settings:

- Incessant VT or VF (hemodynamically stable VT or VF continuing for hours)
- VF or VT is due to a reversible cause such as:
  - Severe electrolyte disturbance
  - Drug-induced Torsades de Pointes (TdP)
  - Acute, reperfused myocardial infarction with preserved ejection fraction
- In an ablation candidate without structural heart disease

Substernal implantable cardioverter-defibrillator (CRID-2.8)

CPT® 0571T

- Substernal implantable cardioverter-defibrillator systems involve inserting a defibrillator lead directly beneath the sternum anterior to the heart and is intended to provide anti-tachycardia pacing as well as post-shock pacing without intravenous leads.
- At this time, substernal implantable cardioverter-defibrillator systems are considered experimental, investigational, and unproven.

Evidence Discussion

ICD implantation is **not** medically necessary for individuals who do not have a reasonable expectation of survival with an acceptable functional status for at least one year, even if they meet ICD implantation criteria listed in this guideline.

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Pediatric Implantable Cardioverter Defibrillator

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Pediatric ICD Indications (CRID-12)

General Information

The decision to manage a pediatric condition with an implantable cardioverter defibrillator should be shared between a pediatric electrophysiologist and an informed individual/guardian/parent. This includes education of the individual/guardian/parent on all available options/potential side-effects, including inaction. This is of particular importance in individuals with limited health literacy at risk for poor health outcomes. These guidelines have been developed based on the 2021 PACES Expert Consensus Statement on the Indications and Management of Cardiovascular Implantable Electronic Devices in Pediatric individuals and the 2024 AHA/ACC/AMSSM/HRS/PACES/SCMR Guideline for the Management of Hypertrophic Cardiomyopathy.

These guidelines are not considered to be all-inclusive but to provide a path to the current indications supported by the societies and evidence.

Coding

Description	CPT®
Insertion or replacement of permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber	33249
Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters when performed	33270

Implantable Cardioverter-defibrillator General Indications (CRID-12.0)

ICD implantation is considered medically necessary for survivors of pediatric sudden cardiac arrest (SCA) from ventricular tachycardia (VT) or ventricular fibrillation (VF) when both of the following have been addressed:

- completely reversible causes have been excluded

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- ICD is decided in consultation with an informed individual/guardian/parent to be more beneficial than alternative treatments that may significantly reduce the risk of SCA

ICD implantation is considered medically necessary for sustained VT that cannot be adequately controlled with medication and/or catheter ablation.

ICD therapy is considered medically necessary for primary prevention of SCA when all of the following conditions exist:

- decision has been made in consultation with an informed individual/guardian/parent
- the individual has a history of either of the following:
  - a genetic cardiovascular disease and risk factors for SCA
  - a pathogenic mutation and a family history of recurrent SCA

ICD replacement is considered medically necessary in a pediatric individual when indications have been reconsidered based on the most recent guidelines to evaluate for discontinuance of therapy.

Long QT Syndrome (LQTS) (CRID-12.1)

ICD implantation is considered medically necessary in individuals with LQTS in any of the following settings:

- survivors of SCA along with the use of beta-blockade
- individuals with symptoms (arrhythmic syncope or VT) when beta-blockade is either ineffective or not tolerated and cardiac sympathetic denervation or other medications are not considered effective alternatives
- primary prevention in individuals with established clinical risk factors and/or pathogenic mutation

Catecholaminergic Polymorphic Ventricular Tachycardia (CRID-12.2)

ICD implantation is considered medically necessary in individuals with a diagnosis of CPVT in any of the following settings:

- persistent cardiac arrest or arrhythmic syncope despite treatment with beta-blocker and flecainide or cardiac sympathetic denervation
- in combination with pharmacologic therapy with or without cardiac sympathetic denervation when aborted SCA is the initial presentation of CPVT
- documented polymorphic or bidirectional VT despite pharmacologic therapy with or without cardiac sympathetic denervation

Brugada Syndrome (BrS) (CRID-12.3)

ICD implantation is considered medically necessary in individuals with a diagnosis of BrS when there is a history of any of the following conditions:

- survivors of SCA

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- documented spontaneous sustained VT
- a spontaneous type I Brugada ECG pattern with a history of recent syncope presumed due to a ventricular arrhythmia
- syncope presumed due to a ventricular arrhythmia with a type I Brugada ECG pattern only with provocative medications

Hypertrophic Cardiomyopathy (HCM) (CRID-12.4)

ICD implantation is considered medically necessary in individuals with HCM in the setting of any of the following conditions:

- survivors of SCA
- spontaneous sustained VT
- ICD is decided after considering the potential complications of long-term ICD placement in consultation with an informed individual/guardian/parent to be more beneficial than alternative treatments in an individual with ≥1 primary risk factors including any of the following:
  - unexplained syncope
  - massive left ventricular hypertrophy
  - non-sustained VT
  - family history of early HCM-related SCD
- in individuals with HCM without the above risk factors but with secondary risk factors for SCA such as extensive LGE on cardiac MRI or systolic dysfunction

Arrhythmogenic Cardiomyopathies (ACM) (CRID-12.5)

ICD implantation is considered medically necessary in individuals in any of the following settings:

- individual has been resuscitated from SCA or sustained VT that is not hemodynamically tolerated
- in individuals with hemodynamically tolerated sustained VT, syncope presumed due to ventricular arrhythmia, or an LVEF less than or equal to 35%.
- in individuals with inherited ACM associated with increased risk of SCD based on an assessment of additional risk factors

Non-ischemic Dilated Cardiomyopathy (NIDCM) (CRID-12.6)

ICD implantation is considered medically necessary in individuals with NIDCM who either survive SCA or experience sustained VT not due to completely reversible causes.

ICD implantation is considered medically necessary in individuals with NIDCM and syncope or an LVEF ≤35% after less than or equal to 3 months of **OMT**.

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Congenital Heart Disease (CHD) (CRID-12.7)

ICD implantation is considered medically necessary for individuals with CHD for any of the following reasons:

- survivors of SCA when evaluation to define the cause of the event does not reveal any completely reversible causes
- individuals with hemodynamically unstable sustained VT who have undergone hemodynamic and electrophysiologic evaluation
- individuals with systemic LVEF ≤35% and sustained VT or presumed arrhythmogenic syncope
- individuals with spontaneous hemodynamically stable sustained VT who have undergone hemodynamic and electrophysiologic evaluation
- individuals with a single or systemic right ventricular ejection fraction less than or equal to 35%, particularly in the presence of additional risk factors such as VT, arrhythmic syncope, or severe systemic AV valve insufficiency.

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Cardiac Resynchronization Therapy (CRT) Devices

Guideline

Indications for Cardiac Resynchronization Therapy (CRT-D) Implantation (CRID-5)
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Indications for Cardiac Resynchronization Therapy (CRT-D) Implantation (CRID-5)

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Procedures included

CPT® 33224, 33225, 33208, 33229, 33249, 33264

Ischemic Cardiomyopathy (CRID-5.1)

CRT-D implantation is medically necessary for the treatment of ischemic cardiomyopathy when LVEF is less than or equal to 35% after greater than or equal to 3 month **OMT** with **any** of the following conditions:

- Sinus Rhythm with LBBB and **both** of the following:
  - QRS from 120 msec to 149 msec
  - NYHA Functional Class II, III, or ambulatory IV
- Sinus Rhythm with LBBB and **both** of the following:
  - QRS greater than or equal to 150 msec
  - NYHA functional class I, II, III, or ambulatory IV
- Sinus rhythm with non-LBBB and **both** of the following:
  - QRS greater than or equal to 150 msec
  - NYHA functional class III, or ambulatory IV
- Persistent or permanent atrial fibrillation and LBBB with QRS greater than or equal to 150 msec

CRT-P is considered medically necessary when all of the requirements of CRT-D have been met and the individual in consultation with the providing physician declines the ICD function.

Non-ischemic Cardiomyopathy (CRID-5.3)

CRT-D is medically necessary for the treatment of non-ischemic cardiomyopathy when LVEF is less than or equal to 35% after greater than or equal to 3 months of **OMT** with **any** of the following conditions:

- Sinus rhythm with LBBB and **both** of the following:

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  - QRS 120 msec to 149 msec
  - NYHA Functional Class II, III, or ambulatory IV
- Sinus rhythm with LBBB and **both** of the following:
  - QRS greater than or equal to 150 msec
  - NYHA Functional Class I, II, III, or ambulatory IV
- Sinus rhythm with Non-LBBB and **both** of the following:
  - QRS greater than or equal to 150 msec
  - NYHA Functional class III, or ambulatory class IV
- Persistent or Permanent atrial fibrillation and **both** of the following:
  - QRS greater than or equal to 150 msec
  - LBBB

CRT-P is considered medically necessary when all of the requirements of CRT-D have been met and the individual in consultation with the providing physician declines the ICD function.

Current or Anticipated RV Pacing with an Indication for an ICD (CRID-5.6)

CRT-D implantation is considered medically necessary for treatment of individuals who meet **all** of the following conditions:

- Current or anticipated RV pacing over 40%
- LVEF less than or equal to 35% after greater than or equal to 3 months of **OMT**
- NYHA Functional Class I, II, III, or ambulatory IV

CRT-P is considered medically necessary when all of the requirements of CRT-D have been met and the individual in consultation with the providing physician declines the ICD function.

Indications for upgrade to CRT-D (CRID-5.7)

Upgrade to CRT-D is medically necessary in individuals who have an implanted non-CRT-D ICD when **either** of the following conditions are documented:

- LVEF greater than or equal to 50% prior to ICD implant and **both** of the following are documented:
  - RV pacing burden greater than or equal to 40%
  - **One** of the following changes has occurred after implantation of non-CRT ICD:
    - Decline in LVEF greater than or equal to 10%
    - New or worsening heart failure symptoms (NYHA Class II or III)

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- LV ejection fraction less than or equal to 35% after greater than or equal to 3 months of **OMT** and **both** of the following are documented:
  - New or worsening symptomatic heart failure (NYHA functional Class II, III, or ambulatory class IV) following implantation of a non-CRT pacemaker or cardioverter-defibrillator (ICD)
  - Ventricular pacing greater than or equal to 40%

CRT-P is considered medically necessary in an individual with a non CRT pacemaker when all of the other requirements of CRT-D have been met and the individual in consultation with the providing physician declines the ICD function.

Indications for CRT-P (CRID-5.8)

Procedures included

CPT® 33224, 33225, 33208, 33229

CRT-P is medically necessary for any of the following:

- High grade AV block and NYHA Class I, II or III Congestive Heart Failure:
  - Initial CRT-P implantation is medically necessary in individuals who have **all** of the following:
    - LV ejection fraction less than 50%
    - NYHA Class I, II, or III heart failure
    - High grade AV block, including AV nodal ablation, requiring more than 40% ventricular pacing CRT-P
- Pacing-induced cardiomyopathy
  - Upgrade from non-CRT pacemaker to CRT-P is medically necessary in individuals who have **all** of the following:
    - LVEF greater than or equal to 50% prior to implantation of non-CRT pacemaker
    - Right ventricular pacing burden greater than or equal to 40%
    - One of the following occurring after implantation of non-CRT pacemaker:
      - Decline in LVEF greater than or equal to 10%
      - New or worsening heart failure symptoms NYHA Class II or III
- See also **Indications for Cardiac Resynchronization Therapy (CRT)-D Implantation** for individuals who have met requirements for CRT-D, but decline the ICD function

Indications for conduction system pacing

His bundle pacing or left bundle branch area pacing (CPT® 33207 or CPT® 33208) is considered medically necessary when **Indications for CRT)** are met and one of the following applies:

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- LV lead placement was attempted and was unsuccessful or suboptimal
- His bundle pacing or left bundle branch area pacing is planned in place of biventricular pacing

CRT Implantation - Non-indications (CRID-5.9)

Ischemic cardiomyopathy

CRT-D or CRT-P implantation is **not** medically necessary in individuals with ischemic cardiomyopathy who have had a myocardial infarction within the past 40 days or who have had coronary revascularization within the past 90 days **unless** a separate indication for permanent pacemaker or ICD implantation exists (thus preventing a likely repeat procedure for an upgraded device in the near future)

Reversible causes of cardiomyopathy

CRT-D implantation is **not** medically necessary in the setting of a reversible cardiomyopathy such as: toxic, metabolic, or tachycardia induced cardiomyopathy

Note: Once the reversible aberration is corrected, clinical reassessment is indicated

Wireless cardiac resynchronization - Criteria (CRID-5.10)

- Permanent LV leadless pacemakers (CPT® 0515T) are implanted directly in the left ventricle for synchronization with RV leads in the setting of cardiac resynchronization therapy. At this time, they are considered experimental, investigational, or unproven.

Evidence Discussion CRT

Evidence Discussion

Cardiac Resynchronization Pacing Therapy (CRT-P)

Asynchrony of electrical activation of different portions of the ventricles results in dyssynchrony of mechanical contraction leading to decreased efficiency of pump function. The cardiac resynchronization pacing device synchronizes electrical activation through a right ventricular lead and a lead inserted into a branch of the coronary venous system for left ventricular activation. Clinical decision-making for cardiac resynchronization pacing therapy includes consideration of an individual's risk of worsening symptomatic heart failure and the anticipated likelihood of favorable clinical response to cardiac resynchronization therapy balanced against short-term procedural risks (e.g., cardiac tamponade and contrast-mediated acute kidney injury) as well as

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long-term device-related risks (e.g., thrombosis and infection). Randomized controlled clinical trials and systematic reviews of these trials provide valuable information to guide optimal selection of candidates for cardiac resynchronization pacing therapy. For instance, the benefit-risk assessment for cardiac resynchronization pacing therapy is favorable for individuals with left ventricular ejection fraction less than 50% who require frequent ventricular pacing greater than 40% of the time. Conversely, the benefit-risk assessment for cardiac resynchronization pacing therapy is NOT favorable for individuals who have better left ventricular ejection fraction or who do not require ventricular pacing or require ventricular pacing only infrequently. Indications for cardiac resynchronization pacing therapy are based on well-established clinical medical specialty organization evidence-based guideline recommendations and Appropriate Use Criteria.

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Other Cardiac Implantable Devices

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Cardiac Devices for Other Conditions

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Wireless pulmonary artery pressure sensor - Criteria (CRID-13)

Codes addressed

Description	CPT®
Transcatheter implantation of wireless pulmonary artery pressure sensor for long-term hemodynamic monitoring, including deployment and calibration of the sensor, right heart catheterization, selective pulmonary catheterization, radiological supervision and interpretation, and pulmonary artery angiography, when performed	33289

Indications

Although FDA approved, the wireless pulmonary artery pressure sensor device (e.g., CardioMEMS™ HF System) has yet to be incorporated into the standard of care and is considered experimental, investigational, or unproven at this time.

Evidence Discussion

Wireless Pulmonary Artery Pressure Sensor devices (CPT® 33289) such as CardioMEMS™ HF System, are implanted into a branch of the pulmonary artery during right heart catheterization and require a specialized delivery system. These devices monitor constant pulmonary artery pressures over time, utilizing the concept that as pulmonary artery pressures increase, outpatient medical therapy can be adjusted. This can potentially reduce inpatient admissions and treatment.

- Although FDA approved, these devices have yet to be incorporated into the standard of care and remain investigational and experimental at this time.

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Wireless Left Atrial Pressure Sensor (CID-14)

Codes included

Description	CPT®
Transcatheter implantation of wireless left atrial pressure sensor for long-term left atrial pressure monitoring, including sensor calibration and deployment, right heart catheterization, transseptal puncture, imaging guidance, and radiological supervision and interpretation	0933T

Indications

Further studies are needed to evaluate the safety, clinical efficacy, and long-term stability of the wireless left atrial pressure sensor device. Wireless left atrial pressure sensor is considered experimental, investigational, or unproven at this time.

Evidence Discussion

Wireless left atrial pressure sensor (e.g., V-LAP™ system) implantation is performed percutaneously via femoral vein access and trans-atrial septal approach. It is proposed that the availability of hemodynamic parameters might allow clinicians to tailor heart failure treatment.

Cardiac Contractility Modulation (CRID-15)

Codes included

Description	CPT®
Insertion or replacement of permanent cardiac contractility modulation system, including contractility evaluation when performed, and programming of sensing and therapeutic parameters; pulse generator with transvenous electrodes	0408T
Insertion of permanent cardiac contractility modulation-defibrillation system component(s), including fluoroscopic guidance, and evaluation and programming of sensing and therapeutic parameters; pulse generator and dual transvenous electrodes/leads (pacing and defibrillation)	0915T

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Cardiac contractility modulation (CCM)

CPT® 0408T

Currently, there is insufficient evidence of benefit of cardiac contractility modulation (CCM) on clinical outcomes. CCM devices (e.g.,Optimizer Smart®) are considered experimental, investigational, or unproven at this time.

Combined Cardiac Contractility Modulation and Implantable Cardioverter-Defibrillator Device (CCM-D)

CPT® 0915T

Currently there is insufficient evidence of safety, efficacy, and benefit of combined cardiac contractility modulation and implantable cardioverter defibrillator devices (CCM-D) devices on clinical outcomes. CCM-D devices (e.g., Optimizer® Integra™ CCM-D System) are considered experimental, investigational, or unproven at this time.

Evidence Discussion

Cardiac contractility modulation (CCM) delivers electrical signals during the ventricular absolute refractory period. This does not generate an action potential or mechanical contraction but is proposed to enhance ventricular contractile strength. CCM has been proposed as a potential treatment option for individuals with symptomatic heart failure with reduced left ventricular ejection fraction who are not candidates for cardiac resynchronization therapy.

CCM has previously been used along with a separate implantable cardioverter-defibrillator device (ICD). The Combined Cardiac Contractility Modulation and Implantable Cardioverter-Defibrillator Device (CCM-D) combines CCM and ICD functionality in one device.

Baroreflex Activation Therapy (CRID-16)

Description	CPT®
Initial open implantation of baroreflex activation therapy (BAT) modulation system, including lead placement onto the carotid sinus, lead tunneling, connection to a pulse generator placed in a distant subcutaneous pocket (ie, total system), and intraoperative interrogation and programming	64654

Currently there is insufficient evidence of benefit of baroreflex activation therapy on clinical outcomes. Carotid baroreflex activation therapy (e.g., Barostim™ device) is considered experimental, investigational, or unproven at this time.

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Evidence Discussion

Carotid baroreflex activation therapy (e.g., Barostim™ device) uses a subcutaneously implanted pulse generator and electrode system to deliver electrical impulses to the carotid artery baroreceptors. Carotid baroreflex activation is aimed at decreasing sympathetic activity and increasing parasympathetic activity and has been proposed as a potential treatment option for individuals with symptomatic heart failure with reduced left ventricular ejection fraction.

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General Guidelines (CH-1)

Guideline

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Abbreviations for Chest Guidelines

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Abbreviations for Chest Guidelines	
AAA	abdominal aortic aneurysm
ACE	angiotensin-converting enzyme
AVM	arteriovenous malformation
BP	blood pressure
CAD	computer-aided detection
CBC	complete blood count
COPD	chronic obstructive pulmonary disease
CT	computed tomography
CTA	computed tomography angiography
CTV	computed tomography venography
DVT	deep venous thrombosis
ECG	electrocardiogram
EM	electromagnetic
EMG	electromyogram
FDA	Food and Drug Administration
FDG	fluorodeoxyglucose
FNA	fine needle aspiration
GERD	gastroesophageal reflux disease

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Abbreviations for Chest Guidelines	
GI	gastrointestinal
HRCT	high resolution computed tomography
IPF	idiopathic pulmonary fibrosis
LFTP	localized fibrous tumor of the pleura
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging
MRV	magnetic resonance venography
NCV	nerve conduction velocity
PE	pulmonary embolus
PET	positron emission tomography
PFT	pulmonary function tests
PPD	purified protein derivative of tuberculin
RODEO	Rotating Delivery of Excitation Off-resonance MRI
SPN	solitary pulmonary nodule
SVC	superior vena cava

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General Guidelines (CH-1.0)

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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms is required prior to considering advanced imaging.
  - A pertinent clinical evaluation should include the following:
    - a detailed history and physical examination
    - appropriate laboratory studies and basic imaging, such as plain radiography or ultrasound
      - A chest x-ray since the onset or change in symptoms that has been over read by a radiologist would be performed in many of these cases prior to considering advanced imaging.
        - Identify and compare with previous chest films to determine presence and stability.
  - For an established individual a meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
  - When smoking history is referred to or required this is speaking to cigarette smoking history and not other smoking substances, unless other substances are directly mentioned in the relative guideline section.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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General Guidelines – Chest X-Ray (CH-1.1)

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- Chest x-ray can help identify previously unidentified disease and direct proper advanced imaging for such conditions as:
  - mediastinal lymphadenopathy (See **Mediastinal Lymphadenopathy (CH-2.3)**)
  - cough (See **Cough (CH-3.1)**)
  - non-cardiac chest pain (See **Non-Cardiac Chest Pain - Imaging (CH-4.1)**)
  - dyspnea (See **Dyspnea/Shortness of Breath (CH-5.1)**)
  - suspected post endobronchial valve complication (See **Post Endobronchial Valve (EBV) Placement (CH-5.3)**)
  - hemoptysis (See **Hemoptysis (CH-6.1)**)
  - bronchitis (See **Bronchitis (CH-8.1)**)
  - asbestos exposure (See **Asbestos Exposure (CH-9.1)**)
  - chronic obstructive pulmonary disease (See **COPD (CH-10.1)**)
  - e-cigarette or vaping product use-associated lung injury (See **E-cigarette, or Vaping, Product-Use Associated Lung Injury (EVALI) (CH-11.2)**)
  - pleural effusion (See **Pleural Effusion (CH-18.1)**)
  - pneumothorax or hemothorax (See **Pneumothorax/Hemothorax (CH-19.1)**)
  - pneumomediastinum (See **Pneumomediastinum; Subcutaneous Emphysema (CH-19.2)**)
  - fractured ribs, sternum, or clavicle (See **Chest Trauma (CH-21.1)**)
  - chest wall mass (See **Chest Wall Mass (CH-22.1)**)
  - acute and chronic infections (See **Pneumonia and Coronavirus Disease 2019 (COVID-19) (CH-13)** and **Other Chest Infections (CH-14)**)
  - malignancies
- Exceptions to preliminary chest x-ray may include such conditions as:
  - supraclavicular lymphadenopathy (See **Supraclavicular Region (CH-2.1)**)
  - axillary lymphadenopathy (See **Axillary Lymphadenopathy (and Mass) (CH-2.2)**)
  - costochondritis (See **Costochondritis/Other Musculoskeletal Chest Wall Syndrome (CH-4.2)**)
  - pre-operative assessment (See **Pre-Operative Assessment CH-5.2)**)
  - known bronchiectasis (See **Bronchiectasis (CH-7.1)**)
  - cystic fibrosis (See **Adult Cystic Fibrosis (CH-7.2)**)
  - suspected interstitial lung disease (See **Interstitial Lung Disease (ILD)/Diffuse Lung Disease (DLD) (CH-11.1)**)

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- positive PPD or tuberculosis (See **Other Chest Infections (CH-14)**)
- sarcoidosis (See **Sarcoid (CH-15.1)**)
- pulmonary nodules (See **Solitary Pulmonary Nodule (SPN) (CH-16)** and **Pleural-Based Nodules and Other Abnormalities (CH-17.1)**)
- mediastinal mass (See **Mediastinal Mass (CH-20.1)**)
- pectus excavatum and carinatum (See **Pectus Excavatum and Carinatum (CH-23.1)**)
- pulmonary arteriovenous fistula (See **Pulmonary AVM (CH-24.1)**)
- pulmonary embolism (See **Pulmonary Embolism (CH-25.1)**)
- elevated hemidiaphragm (See **Elevated Hemidiaphragm (CH-30.1)**)
- pre- or post-lung transplant (See **Lung Transplantation (CH-32)**)
- lung cancer screening (See **Lung Cancer Screening (CH-33)**)

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General Guidelines – Chest Ultrasound (CH-1.2)

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Criteria

- Chest ultrasound (CPT® 76604) includes transverse, longitudinal, and oblique images of the chest wall with measurements of chest wall thickness, and also includes imaging of the mediastinum. It may be helpful in identifying pleural effusions (See **Pleural Effusion (CH-18)**).
  - Chest ultrasound:
    - CPT® 76604
  - Breast ultrasound:
    - CPT® 76641: unilateral, complete
    - CPT® 76642: unilateral, limited
    - CPT® 76641 and CPT® 76642 be reported only once per breast, per imaging session
  - Axillary ultrasound:
    - CPT® 76882 (unilateral); if bilateral, can be reported as CPT® 76882 x 2

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General Guidelines – CT Chest (CH-1.3)

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Criteria

- Intrathoracic abnormalities as covered in these guidelines found on chest x-ray, fluoroscopy, CT Abdomen, or other imaging modalities can be further evaluated with CT Chest with contrast (CPT® 71260).
- CT Chest without contrast (CPT® 71250) can be used for the following:
  - individual has contraindication to contrast
  - follow-up of pulmonary nodule(s)
  - High Resolution CT (HRCT)
- For low-dose CT Chest (CPT® 71271 OR CPT® 71250): See **Lung Cancer Screening (CH-33).**
- CT Chest without and with contrast (CPT® 71270) does not add significant diagnostic information above and beyond that provided by CT Chest with contrast, unless a question regarding calcification, most often within a lung nodule, needs to be resolved.

CT Chest Coding Notes:

- High-resolution CT Chest should be reported only with an appropriate code from the set CPT® 71250-CPT® 71270.
  - No additional CPT® codes should be reported for the “high-resolution” portion of the scan. The “high-resolution” involves additional slices which are not separately billable.
- Low-dose CT chest does not have a specific, separate CPT® code associated with it. It should be reported with the standard CT chest CPT code (CPT® 71250).
  - An exception to this is the low-dose CT used specifically for the annual lung cancer screening scans, for which CPT® 71271 is used.

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General Guidelines – CTA Chest (CPT® 71275) (CH-1.4)

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Criteria

- CTA Chest (CPT® 71275) is medically necessary for:
  - non-cardiac chest pain (See **Non-Cardiac Chest Pain - Imaging (CH-4.1)**)
  - hemoptysis (See **Hemoptysis (CH-6.1)**)
  - pulmonary arteriovenous fistula (See **Pulmonary AVM (CH-24.1)**)
  - pulmonary embolism (See **Pulmonary Embolism (CH-25.1)**)
  - pre-lung transplantation (See **Pre-Transplant Imaging Studies (CH-32.1)**)
  - prior to minimally invasive or robotic surgery (See **Transcatheter Aortic Valve Replacement (TAVR) (CD-4.8)** in the Cardiac Imaging Guidelines)

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General Guidelines – MRI Chest without and with Contrast (CPT® 71552) (CH-1.5)

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Criteria

- Indications for MRI Chest are infrequent and may relate to concerns about CT contrast such as renal insufficiency or contrast allergy. MRI is considered medically necessary for:
  - Clarification of equivocal findings on previous imaging studies (often in the thymic mediastinal region).
    - Certain conditions include:
      - mediastinal lymphadenopathy (See **Mediastinal Lymphadenopathy (CH-2.3)**)
      - chest wall mass (See **Chest Wall Mass (CH-22.1)**)
      - mediastinal mass (See **Mediastinal Mass (CH-20.1)**)
      - chest muscle tendon injuries (See **Muscle/Tendon Unit Injuries/Diseases (MS-11.0)** in the Musculoskeletal Imaging Guidelines)
      - pectoralis tendon rupture (See **Muscle/Tendon Unit Injuries/Diseases (MS-11.0)** in the Musculoskeletal Imaging Guidelines)
      - brachial plexopathy (See **Brachial Plexus (PN-4.1)** in the Peripheral Nerve Disorders Imaging Guidelines)
      - thymoma (See **Thymoma and Thymic Carcinoma - Suspected/Diagnosis (ONC-10.5)** in the Oncology Imaging Guidelines)

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General Guidelines – Nuclear Medicine (CH-1.6)

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CPT	Description
78580	Pulmonary perfusion imaging (eg, particulate)
78582	Pulmonary ventilation (eg, aerosol or gas) and perfusion imaging
78597	Quantitative differential pulmonary perfusion, including imaging when performed
78598	Quantitative differential pulmonary perfusion and ventilation (e.g., aerosol or gas), including imaging when performed

- For pulmonary perfusion imaging (eg, particulate) (CPT® 78580) and pulmonary ventilation (eg, aerosol or gas) and perfusion imaging (CPT® 78582): See **Pulmonary Embolism (CH-25.1)** .
- For quantitative differential pulmonary perfusion, including imaging when performed (CPT® 78597) and quantitative differential pulmonary perfusion and ventilation (e.g., aerosol or gas), including imaging when performed (CPT® 78598): See **Pre-Operative Assessment (CH-5.2).**

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Navigational Bronchoscopy and Biopsy (CH-1.7)

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Criteria

- CPT® 76497 (Unlisted CT procedure) if:
  - A CT Chest has been performed within the last 6 weeks and study is needed for navigational bronchoscopy.
- CT Chest without contrast (CPT® 71250) if:
  - Previous diagnostic scan was ≥6 weeks ago and study is needed for navigational bronchoscopy.
- Bronchoscopy with computer-assisted, image-guided navigation, includes three-dimensional reconstruction. Do not report in conjunction with 3-D rendering CPT codes (CPT® 76376) or (CPT® 76377).
- Core needle biopsy (CPT® 32408) for:
  - Biopsy of the lung or mediastinum to diagnose malignancy.
- For robotic-assisted lung resection, see **Pre-Operative Assessment (CH-5.2)**.

Background and Supporting Information

- Navigational bronchoscopy: This is a form of guided bronchoscopy. A special sensor inside a bronchoscopy is used to navigate to the desired location within the lung. Computer software generates a virtual bronchial tree which provides a road map to the target lesion(Cicenia et al., 2020; Gildea et al., 2006; Mehta et al., 2018). A thin-cut CT Chest with optimized reconstruction parameters is required to generate the virtual map of the lungs. A previous CT Chest may not be usable for navigation if it was not formatted correctly, even if done just a few days prior(Cicenia et al., 2020).
- Names for navigational bronchoscopy systems can include:
  - superDimension or super-D
  - Spin Thoracic Navigation System
  - Archimedes
  - Monarch Platform - robotic
  - Ion - endoluminal robotic bronchoscopy platform
  - Shape-sensing robot assisted bronchoscopy (ssRAB)
- The diagnostic accuracy of navigational bronchoscopy is 70.9-79% (Kops et al., 2023; Lentz et al., 2025). It has an excellent safety profile, with an adverse event rate

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(e.g., pneumothorax) of 3.3-5.6% (Kops et al., 2023; Lentz et al., 2025; Podder et al., 2022).

- Cone-Beam CT, (CBCT) is a newer technique that helps locate the nodule in real time (Piro et al., 2021; Podder et al., 2022). Studies have shown comparable results and diagnostic yields to other guided bronchoscopy strategies. CBCT combined with other navigational techniques often reaches a higher navigational success rate and diagnostic rate (Piro et al., 2021; Podder et al., 2022; Yang et al., 2025). However, a recent study found no statistically significant differences in diagnostic sensitivity, specificity, and accuracy between those who received CBCT and other methods (Yang et al., 2025). Additionally, CBCT can expose the individual and operator to radiation through the repeated acquisition of images. The mean radiation dose was determined to be 48.4 Gy cm^2 per case; this excessive and unnecessary radiation can cause radioactive damage to the individual and the operator. Another study concluded that, "Additional studies are warranted to confirm the safety and efficacy of this technique" (Piro et al., 2021). Efforts are required to improve diagnostic accuracy and standardized practices before CBCT can be considered mainstream. Large-scale randomized controlled trials that compare CBCT with other navigational techniques are necessary to determine the most optimal navigational strategy, clinical criteria for CBCT usage, and the best way to diagnose peripheral pulmonary lesions (Yang et al., 2025).

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Lymphadenopathy (CH-2)

Guideline

Supraclavicular Region (CH-2.1)
Axillary Lymphadenopathy (and Mass) (CH-2.2)
Mediastinal And Hilar Lymphadenopathy (CH-2.3)
References (CH-2)

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Supraclavicular Region (CH-2.1)

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Criteria

- Ultrasound (CPT® 76536) is the initial study for palpable or suspected lymphadenopathy.
  - Allows simultaneous ultrasound-guided needle biopsy (CPT® 76942)
  - CT Neck with contrast (CPT® 70491) or CT Chest with contrast (CPT® 71260) if ultrasound is indeterminate
    - See **General Guidelines (Neck-1.0)** in the Neck Imaging Guidelines

Evidence Discussion

For suspected or palpable supraclavicular lymphadenopathy, ultrasound (US) demonstrates excellent sensitivity, reported to be as high as 100% for the detection of metastatic disease, while CT of the neck shows a comparatively lower sensitivity of approximately 83% for the same lesions (van Overhagen et al., 2004). Ultrasound also avoids ionizing radiation exposure associated with CT, is widely available, and facilitates ultrasound-guided needle biopsy for diagnostic confirmation, when indicated (English et al., 2015; Ackman et al., 2021).

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Axillary Lymphadenopathy (and Mass) (CH-2.2)

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Criteria

- There is no evidence-based support for advanced imaging of clinically evidenced axillary lymphadenopathy prior to a biopsy. If axillary node biopsy reveals benign findings, advanced imaging is considered not medically necessary. If axillary node biopsy reveals findings concerning for malignancy, pathology results will determine the need for further advanced imaging. See **Carcinoma of Unknown Primary Site (ONC-31.7)** in the Oncology Imaging Guidelines for imaging recommendations for carcinoma found in an axillary lymph node.
- Localized axillary lymphadenopathy:
  - Axillary US (CPT® 76882)
    - Initial evaluation of any axillary mass or enlarged node
  - Search for adjacent hand or arm injury or infection, and
  - 3-4 week observation if benign clinical picture (for ipsilateral COVID vaccination-related adenopathy, observation for 12 or more weeks is recommended). Follow-up imaging with ultrasound is considered medically necessary if there is a significant risk of metastatic adenopathy (e.g., breast, head and neck, upper extremity/trunk melanoma or lymphoma)
    - If axillary adenopathy is unchanged, then consider additional follow up 6 months after initial presentation.
  - Ultrasound directed core needle biopsy or surgical excisional biopsy of the most abnormal lymph node if:
    - Condition persists.
    - Malignancy is suspected.
  - Surgical excisional biopsy if core needle biopsy results are non-diagnostic.
  - Advanced imaging is considered not medically necessary.
- Generalized axillary lymphadenopathy:
  - Axillary US (CPT® 76882)
    - Initial evaluation of any axillary mass or enlarged node
  - Ultrasound directed core needle biopsy or surgical excisional biopsy of the most abnormal lymph node if condition persists, if malignancy is suspected, or surgical excisional biopsy if core needle biopsy results are non-diagnostic.
  - Diagnostic work-up, including serological tests, for systemic diseases
  - Advanced imaging is considered not medically necessary.

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  - See **Non-Hodgkin Lymphomas (ONC-27)** in the Oncology Imaging Guidelines.
- Occult primary cancer in axillary lymph node(s):
  - See **Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer (ONC-31)** in the Oncology Imaging Guidelines.
- For unexplained axillary lymphadenopathy in individuals with silicone breast implants, see **Breast Implant Evaluation (BR-5.2)**

Evidence Discussion

Initial evaluation of an axillary mass or axillary lymphadenopathy (LAN) should be ultrasound (US). US allows for real-time evaluation and immediate image-directed biopsy (Sun et al., 2020). CT Chest is usually not appropriate in the evaluation of axillary LAN, especially in the female population with concern for breast cancer (Le-Petross et al., 2022).

Ultrasound is a very important initial imaging modality which is easy to obtain, universally available and portable, exposes individuals to no radiation, and is cost effective (Le-Petross et al., 2022). It is also excellent in helping to determine next best advanced imaging study including appropriate protocol and contrast level. US not only provides excellent soft tissue resolution, but also provides characterization of cystic lesions (Bosniak classification) whether complex or simple to help guide follow up imaging interval or biopsy (Sun et al., 2020).

Background and Supporting Information

- The Society for Breast Imaging (SBI) recommends that for unilateral axillary adenopathy on screening exams who received a recent COVID-19 vaccination in the ipsilateral upper extremity, a follow up interval of 12 or more weeks is recommended. If axillary adenopathy persists after short term follow up, then consider lymph node sampling to exclude breast and non-breast malignancy. Imaging for urgent cancer related clinical indication should not be delayed in relationship to COVID vaccine timing. For routine surveillance, screening and similar non-urgent indications, postponement of imaging for at least 6 weeks after vaccinations should be considered. However, the SBI no longer recommends delaying screening mammograms around COVID-19 vaccinations (Grimm et al., 2021).

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Mediastinal And Hilar Lymphadenopathy (CH-2.3)

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Criteria

- CT Chest with contrast (CPT® 71260) if mediastinal and/or hilar abnormalities are detected on a chest x-ray (over read by a radiologist), other non-dedicated advanced chest imaging, or clarification of mediastinal and/or hilar abnormalities on a non-contrast CT Chest.
  - If contrast cannot be tolerated due to allergy or renal dysfunction, MRI chest without and with contrast (CPT® 71552) OR MRI chest without contrast (CPT® 71550) is considered medically necessary.
  - Follow-up CT Chest (CPT® 71260) is considered medically necessary at least 3 months after the initial CT when: :
    - If enlarged lymph nodes, ≥15 mm (in the short axis)*, are present in the mediastinum or hilar regions with no known condition that fully accounts for the lymphadenopathy. . .
    - If mediastinal lymph nodes are stable or decreasing in size on follow-up CT, further advanced imaging is considered not medically necessary.
  - Further evaluations:
    - Lymph node biopsy (see methods below) is considered medically necessary for:
      - persistent or increasing lymphadenopathy on follow-up CT Chest; or
      - suspected malignancy.
      - See **Non-Hodgkin Lymphomas (ONC-27)** and/or **Hodgkin Lymphoma (ONC-28)** in the Oncology Imaging Guidelines for suspicion of Lymphoma.
- PET/CT (CPT® 78815) is considered medically necessary for enlarged lymph nodes, ≥15 mm (in the short axis)*with no known condition that fully accounts for the lymphadenopathy or increasing lymph node size on follow-up CT Chest.

* If a single measurement is reported without specification of axis, it shall be interpreted as the short-axis measurement for the purposes of these guidelines.

Evidence Discussion

- CT Chest is considered medically necessary for mediastinal and/or hilar abnormalities detected on chest x-ray or other non-dedicated advanced imaging (Jain et al., 2025; Munden et al., 2018). CT allows for further tissue characterization and can distinguish between calcium, macroscopic fat and water attenuation fluid (Jain et al.,

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2025; Goldin, 2025). CT has higher contrast resolution than plain chest radiography (Munden et al., 2018). CT does carry with it the risk of both iodinated contrast exposure and ionizing radiation exposure (Munden et al., 2018; Ackman et al., 2021).

- Asymptomatic, incidental mediastinal and hilar lymph nodes less than 15mm (in the short axis) do not require follow up. Evison et al found that size was the greatest predictor of lymph node etiology with those less than 15mm always found to be reactive (Evison et al., 2014; Munden et al., 2018).
- For mediastinal and hilar lymph nodes greater than or equal to 15mm (in the short axis), follow-up should be directed by suspected etiology. For those with low or no clinical suspicion for malignancy and no other thoracic abnormalities, follow up CT chest at least 3 months after the initial imaging study is considerd medically necessary (O'Dowd et al., 2023; Munden et al., 2018). If the lymph nodes have increased in size on follow-up imaging, PET/CT or tissue biopsy is considered medically necessary (O'Dowd et al., 2023; Evison et al., 2014).
- For those with no known condition that fully accounts for the lymphadenopathy and mediastinal lymph nodes greater than or equal to 15mm, PET/CT is considered medically necessary. However, PET/CT has well-documented false positive results in this setting given the overlap of increased FDG uptake in both oncologic and infection or inflammatory disease processes Munden et al., 2018; Roy & Digumarthy, 2025).

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Cough (CH-3)

Guideline

Cough (CH-3.1)
References (CH-3)

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Cough (CH-3.1)

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Criteria

- Initial evaluation should include a chest x-ray after the current episode of cough started or changed.
  - In addition all medications known to cause coughing (e.g., ACE inhibitors, Sitagliptin) should be discontinued.
- CT Chest (either with contrast [CPT® 71260] or without contrast [CPT® 71250]), if the initial chest x-ray is without abnormalities and all medications known to cause coughing have been discontinued, for the following:
  - Non-smoker cough after the following treatment for a total 3-week trial and investigation after ALL of the following:
    - Antihistamine and decongestant (unless contraindicated, e.g., glaucoma, tachyarrhythmia, etc.) or intranasal glucocorticoid treatment.
    - Spirometry and/or pulmonary function tests (PFT's).
    - Empiric trial of corticosteroids (oral or inhaled) and/or leukotriene receptor antagonist (e.g., Montelukast).
    - Treatment of gastroesophageal reflux disease (GERD).
      - See **Sinus and Facial Imaging (HD-29.1)** in the Head Imaging Guidelines.
  - Current or past cigarette smokers with either:
    - new cough lasting greater than 2 weeks
    - changed chronic cough in worsening frequency or character
      - See **Hemoptysis (CH-6.1)**
  - See the relevant Chest Imaging Guideline section for advanced chest imaging to evaluate any abnormalities present on the initial chest x-ray.
  - For individuals with high suspicion for lung cancer despite normal chest x-ray:
    - See **Non-Small Cell Lung Cancer Suspected/Diagnosis (ONC-8.2)**
- CT Maxillofacial without contrast (CPT® 70486) or CT Sinus, limited without contrast (CPT® 76380) is considered medically necessary in those with suspicion of Upper Airway Cough Syndrome (UACS) in the following:
  - Clinical criteria for chronic rhinosinusitis (CRS) or acute/recurrent rhinosinusitis are met, as per **Sinus and Facial Imaging (HD 29.1)**; **OR** ALL of the following:
    - at least a one week trial of daily antihistamine/decongestant
    - initial evaluation with a chest x-ray and/or CT Chest after the current episode of cough started or changed
    - all medications known to cause cough have been discontinued

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Evidence Discussion

CT chest is not recommended routinely in people with a chronic cough, normal chest x-ray, and normal physical exam. There is concern regarding potential cancer risk from CT radiation exposure, especially in women and children (Expert Panel on Thoracic Imaging et al., 2021; Morice et al., 2020). For individuals with cough of unknown etiology or a chronic cough refractory to therapy, a CT chest may identify changes not seen on chest x-ray, such as interstitial lung disease or bronchiectasis (Expert Panel on Thoracic Imaging et al., 2021; Morice et al., 2020; Truba et al., 2023).

Current or former smokers with a new cough or change in chronic cough do not need a trial of therapy for UACS, asthma or GERD prior to a chest CT if an initial chest x-ray is abnormal or non-diagnostic (Irwin et al., 2018; Expert Panel on Thoracic Imaging et al., 2021).

CT maxillofacial may be considered for suspected chronic rhinosinusitis (CRS) as the cause of chronic cough after clinical examination and chest x-ray if there is no response to empiric therapy or if the history and nasal endoscopy findings are concerning for CRS (Donaldson, 2023; Pratter, 2006; Dykewicz et al., 2020).

Objective evidence of classic asthmatic cough conventionally requires some evidence of variable airflow obstruction such as peak flow variability, or reversibility to bronchodilator of ≥10% change in FEV1 (Stanojevic et al., 2022)

When cough remains refractory to treatment, high-resolution CT scanning of the thorax is recommended to rule out parenchymal lung disease that is not visible on plain chest x-ray (Morice et al., 2020; Expert Panel on Thoracic Imaging et al., 2021; Irwin & Madison, 2025).

Cough Health Equity Considerations

Health Equity Considerations for Cough

- Chronic cough is more prevalent in older adults. Younger adults with chronic cough are more likely to be men, and older adults are more likely to be women.

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Non-Cardiac Chest Pain (CH-4)

Guideline

Non-Cardiac Chest Pain – Imaging (CH-4.1)
Costochondritis/Other Musculoskeletal Chest Wall Syndrome (CH-4.2)
References (CH-4)

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Non-Cardiac Chest Pain – Imaging (CH-4.1)

CH.CP.0004.1.A
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Criteria

- Initial evaluation should include a chest x-ray after the onset of presenting or current symptoms.
  - CT Chest with contrast (CPT® 71260) or CTA Chest (CPT® 71275) if x-ray is abnormal. See **Pneumonia (CH-13.1)**
- Sub-Sternal Non-Cardiac Chest Pain:
  - If x-ray is normal and the chest pain is substernal, the individual should undergo evaluation of other possible causes of pain prior to advanced imaging (CT Chest with contrast or CTA Chest) including:
    - Cardiac evaluation (See General Guidelines (CD-1) in the Cardiac Imaging Guidelines)
    - GI treatment with any ONE of the following:
      - Trial of anti-reflux medication, or pH probe, or esophageal manometry or
      - Barium swallow or endoscopy
    - Pulmonary Function Test (PFT's) in those with known or suspected respiratory disease
  - CT Chest with contrast (CPT® 71260) if persistent:
    - The initial chest x-ray reveals no abnormalities with known Sickle cell disease
- Non-Cardiac Chest Pain, other than Sub-Sternal:
  - If x-ray is normal and the chest pain is in a location other than substernal:
    - CT Chest with (CPT® 71260) or without (CPT® 71250) contrast and/or bone scan for:
      - known or suspected malignancy, including individuals with chest pain associated with cough and weight loss
    - CT Chest with (CPT® 71260) or without (CPT® 71250) contrast for:
      - suspected infectious or inflammatory condition
      - history of prior chest intervention (surgery, Radiation Therapy)
    - MRI Chest without and with contrast (CPT® 71552) for:
      - necrotizing fasciitis
      - surgical planning prior to debridement procedure
  - For suspected migration of implantable contraceptive devices, see Implantable Contraceptive Devices (PV-10.3)

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Evidence Discussion

It is important to rule out potentially life-threatening causes of acute chest pain, such as an acute coronary syndrome, aortic dissection, and pulmonary embolus. These topics are discussed in other guideline summaries (CD 1.0, CD 1.4, PVD 6.2 and PVD 6.3, CH 25.1). A specialized imaging protocol called the "triple rule-out" is sometimes used to evaluate the pulmonary arteries, aorta and coronary arteries. However, it is associated with higher non-diagnostic imaging quality, radiation and contrast doses Burris et al., 2015). The population for which it may be useful is unknown. It is yet to be proven useful in large clinical trials, and its appropriate use needs to be further defined (Burris et al., 2015; Hollander & Chang, 2015; Kirsch et al., 2022).

An evaluation for the cause of non-cardiac "angina-like" chest pain should be done if it persists or recurs despite a negative stress test or anatomic cardiac evaluation, or a low risk designation by a clinical decision pathway.[11] The differential diagnosis of non-cardiac chest pain is broad. The most common causes in a primary care setting are chest wall pain, reflux esophagitis, and costochondritis (McConaghy et al., 2020). Respiratory causes include pneumonia, pleuritis , and pneumothorax. People with COPD or acute asthma exacerbations may experience chest pain (Edmondstone, 2000; Lee et al., 2015). A thorough history and physical exam are important to help narrow the differential diagnosis and direct imaging. Musculoskeletal causes are usually diagnosed based on history and physical exam (point tenderness, reproducibility with palpation) without the need for diagnostic imaging. Most individuals should have an ECG and chest x-ray (CR) (Gulati et al., 2021). CR is rapid, non-invasive and is considered medically necessary in the initial evaluation of acute non-specific chest pain with a low probability of coronary artery disease (CAD) (Beache et al., 2020; Gulati et al., 2021). In individuals without evidence of cardiac or pulmonary disease, evaluation for a GI cause is reasonable. An empiric trial of acid suppression may be merited. If this is ineffective or there are alarm symptoms, an EGD, pH probe and/or motility study should be considered (Frieling, 2018; Gulati et al., 2021; Yamasaki & Fass, 2017).

Individuals with sickle cell disease and acute chest pain should have a CR initially (Gulati et al., 2021). Acute chest syndrome is defined by a new infiltrate on CR with fever and/or respiratory symptoms. In the presence of unexplained hypoxemia and an unremarkable CR, CT chest may be obtained to evaluate the pulmonary vasculature and lung parenchyma (Jain et al., 2017).

CR is considered medically necessary for non-traumatic chest wall pain and no history of malignancy to evaluate for a specific etiology, such as rib fracture, pneumonia, or pneumothorax (Bader et al., 2020; Stowell et al., 2021). Following a normal CR, CT chest is considered medically necessary to evaluate chest pain in the setting of known or suspected malignancy, suspected infectious or inflammatory condition, or a history of prior chest intervention (Stowell et al., 2021). CT is more sensitive than CR for characterizing chest wall neoplasms, chest wall infections, and subtle osseous and soft

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tissue lesions. Chest MRI is useful if there is a high suspicion for necrotizing fasciitis and for surgical planning prior to debridement (Stowell et al., 2021).

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Costochondritis/Other Musculoskeletal Chest Wall Syndrome (CH-4.2)

CH.CP.0004.2.A
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Criteria

- Initial evaluation should include a chest x-ray.
- CT chest (CPT® 71250 or CPT® 71260) is considered medically necessary for inconclusive or nondiagnostic findings on chest x-ray AND one of the following:
  - concern for infectious or neoplastic processes
  - persistent symptoms >3 weeks (despite treatment)
- For MRI requests, see the applicable section:
  - **Infection (MS-9.0)**
  - **Muscle and Tendon Injuries (MS-11)**
  - **Joint Instability and Dysfunction (MS-30)**
  - **Chest Wall Mass (CH-22.1)**
- For slipping rib syndrome, dynamic chest ultrasound (CPT® 76604) is considered medically necessary.
  - CT chest (CPT® 71250 or CPT® 71260) is considered medically necessary only for pre-surgical planning
- For other conditions not mentioned, see **Non-Cardiac Chest Pain - Imaging (CH-4.1)**

Evidence Discussion

Costochondritis is a common cause of chest wall pain in adults presenting to the emergency department and physician's office (Proulx & Zryd, 2009; Mott et al., 2021). It is defined as inflammation of costochondral junctions of ribs or costosternal joints, usually at multiple levels and without any swelling or induration (Proulx & Zryd, 2009). It is a self-limited condition. The diagnosis is largely based on history and physical examination, which reproduces pain on palpation of the chest wall. Upper body movement, deep breathing, and exertional activities often exacerbate the pain (Proulx & Zryd, 2009; Mott et al., 2021). Tietze syndrome presents similarly to costochondritis but includes visible edema at the involved joint(s), typically is unilateral involving the second rib, and is often incited by infection or trauma. Imaging should be directed toward excluding alternative diagnoses, such as chest wall mass, infection, trauma, or other suspected pathology, rather than confirming the diagnosis of Tietze syndrome (Boran & Boran, 2017; Mott et al., 2021; Rokicki et al., 2018). Dynamic chest ultrasound

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accurately diagnoses slipping rib syndrome in 89% of cases and has a 100% negative predictive value (Foley Davelaar, 2021).

There are no laboratory tests or imaging tests findings specifically for the diagnosis of costochondritis (Mott et al., 2021). If an individual relates a history of dyspnea or chest wall trauma, a chest radiograph or rib series is considered medically necessary (Expert Panel on Thoracic Imaging et al., 2021; Mott et al., 2021). Chest radiographs can help identify potential sources of previously undifferentiated chest pain such as pneumothorax, pneumomediastinum, fractured ribs, acute and chronic infections, pneumonia, lung mass, and malignancies (Expert Panel on Cardiac Imaging et al., 2020; Expert Panel on Thoracic Imaging et al., 2021). A large observational study found that 91% of individuals with new-onset costochondritis had resolution of pain after three weeks of treatment with rest and nonsteroidal anti-inflammatory drugs. Thus, chest CT should be reserved for individuals who have persistent symptoms greater than 3-4 weeks, or where there is high suspicion for infection or neoplastic processes (Proulx & Zryd, 2009). Scintigraphy has been studied to determine its usefulness to diagnose costochondritis, but it is not specific for the diagnosis (Proulx & Zryd, 2009).

Most treatment recommendations are conservative in nature and have been traditionally accepted, perhaps because of the self-limited nature of the condition (Proulx & Zryd, 2009; Mott et al., 2021).

Recalcitrant cases may respond to corticosteroid injections (Mott et al., 2021).

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Dyspnea/Shortness of Breath (CH-5)

Guideline

Dyspnea/Shortness of Breath (CH-5.1)
Pre-Operative Assessment (CH-5.2)
Post Endobronchial Valve (EBV) Placement (CH-5.3)
References (CH-5)

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Dyspnea/Shortness of Breath (CH-5.1)

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Criteria

- Initial evaluation should include a chest x-ray since onset or change in symptoms.
  - CT Chest without contrast (CPT® 71250) OR CT Chest with contrast (CPT® 71260) if x-ray is abnormal.
  - CT Chest without contrast (CPT® 71250, including HRCT), or CT Chest with contrast (CPT® 71260) if the initial chest x-ray is indeterminate and the following evaluations have been conducted, since onset or change in symptoms, and are indeterminate:
    - ECG, echocardiogram or stress testing, and
    - Pulse oximetry and pulmonary function studies (PFT's)
- If pulmonary embolus (PE) is suspected, see **Pulmonary Embolism (PE) (CH-25)**.
- If tracheobronchomalacia is suspected, see Imaging of the Larynx, Trachea, and Bronchus (Neck-9.1).
- For persistent dyspnea post-COVID-19 infection, see Coronavirus Disease 2019 (COVID-19) (CH-13.2).

Evidence Discussion

Dyspnea is the subjective experience of breathing discomfort (Parshall et al., 2012). There is no standard approach for the evaluation of chronic dyspnea, and data that test diagnostic algorithms against standard clinical care are limited; however, clinical practice algorithms have been proposed and found to be effective (Budhwar & Syed, 2020; Hudler et al., 2022; Oelsner et al., 2015; Sunjaya et al., 2022). If the diagnosis is not evident after a history and physical exam, initial diagnostic testing with pulse oximetry, spirometry, chest radiography (CR), ECG, and labs is recommended (Budhwar & Syed, 2020; Oelsner et al., 2015; Sunjaya et al., 2022). While the individual utility of these tests varies for a specific diagnosis, they are commonly available and easy to perform (Ferry et al., 2019).

Spirometry can identify obstructive lung disease or suggest restrictive lung disease. The flow-volume loop may suggest intra- or extra-thoracic airway obstruction. Some authors recommend full pulmonary function tests as part of the initial investigation, while others consider spirometry an appropriate initial test (Hudler et al., 2022; Sunjaya et al., 2022). Diagnostic accuracy is improved when spirometry is done in addition to a clinical assessment (Ferry et al., 2019).

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ECG has a high negative predictive value for cardiac disease but low specificity. Thus, further testing such as echo is often necessary (Ferry et al., 2019). The recommended timing of echocardiography differs between algorithms but echo is an important test for cardiac causes of dyspnea (Budhwar & Syed, 2020; Ferry et al., 2019). The American College of Radiology (ACR) states that for dyspnea of suspected cardiac origin, the initial diagnostic imaging should usually be CR followed by transthoracic echo (Expert Panel on Cardiac Imaging, 2022).

CR remains a valuable first line investigation of dyspnea (Budhwar & Syed, 2020). The ACR states that CR should generally be the first imaging study (Expert Panel on Thoracic Imaging, 2024). It may reveal abnormalities or guide further imaging decisions. Data on the diagnostic utility of chest CT for chronic dyspnea are limited. It is often used following an abnormal CR or if other initial testing is negative. The ACR states that CT may be useful when CR abnormalities require further characterization or clinical findings necessitate additional imaging despite a normal CR (Expert Panel on Thoracic Imaging, 2024). CT without intravenous contrast is usually sufficient unless there is a suspicion for vascular abnormalities. The disadvantage is exposure to ionizing radiation; therefore, CT "requires careful patient selection with consideration given to patient age, risk of diagnostic radiation exposure and estimated diagnostic yield"(Ferry et al., 2019).

Dyspnea/Shortness of Breath Health Equity Considerations

- Dyspnea disproportionately affects individuals with a low socioeconomic status.

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Pre-Operative Assessment (CH-5.2)

CH.SB.0005.2.A
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Criteria

- For pre-operative assessment prior to a planned segmental, lobar, or lung removal, as well as for pre-interventional assessment prior to a planned endobronchial valve (e.g., Zephyr valve) placement, the following are considered medically necessary:
  - "Split Function Studies" (CPT® 78597-Quantitative Differential Pulmonary Perfusion, Including Imaging When Performed or CPT® 78598-Quantitative Differential Pulmonary Perfusion and Ventilation (e.g., Aerosol or Gas), Including Imaging When Performed) or SPECT/CT (CPT® 78830)

    AND/OR
  - CT Chest (CPT® 71250, CPT® 71260 or CPT® 71270) for pre-interventional procedure assessment prior to a planned endobronchial valve (e.g., Zephyr Valve) placement.
  - For robotic assisted lung resection, CT chest (CPT® 71250 OR CPT® 71260) is considered medically necessary if:
    - Previous diagnostic scan was ≥6 weeks ago
    - CPT® 76497 (Unlisted CT procedure) if a CT Chest has been performed < 6 weeks ago

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Post Endobronchial Valve (EBV) Placement (CH-5.3)

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Criteria

- Suspected Post EBV Complication:
  - Initial evaluation should include a chest x-ray
    - CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) is considered medically necessary for:
      - acute loss of benefit, lack of initial benefit, increased dyspnea, sudden chest pain, increased cough, suspected valve malposition/migration, or to evaluate target lobe volume reduction

Evidence Discussion

The most common acute complications following EBV placement are pneumothorax, pneumonia, COPD exacerbation and valve migration (Slebos et al., 2017). Pneumothorax occurs in 20-30% of individuals, the majority within the first 48 hours after the procedure. Individuals who have an acute increase in dyspnea, cough or chest pain, or an acute perceived loss of benefit, should have a chest X-ray (CR) to rule out pneumothorax. If the CR is non-diagnostic, a CT chest should be done to evaluate the valve position, the target lobe and volume reduction more precisely (Koster et al., 2020).

Following EBV placement, it may take several days to one month for significant volume reduction and atelectasis of the target lobe to occur. If no significant lung volume reduction is seen on CR at one month, a CT should be done to evaluate valve position (Slebos et al., 2017). A CT chest is performed routinely at some centers 6-8 weeks after EBV placement (Koster et al., 2020). If there has been no clinical benefit and no lobar atelectasis is evident on CT at 6 weeks, a revision bronchoscopy may be necessary (Klooster & Slebos, 2021). The two most common causes of lack of benefit are the presence of interlobar collateral ventilation or valve misplacement/migration.

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Hemoptysis (CH-6)

Guideline

Hemoptysis (CH-6.1)
Reference (CH-6)

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Hemoptysis (CH-6.1)

CH.HS.0006.1.A
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Criteria

- After hemoptysis has started or worsened the following is considered medically necessary:
  - Chest X-ray (CPT® 71046); AND/OR
  - CT Chest with contrast (CPT® 71260) or CTA Chest (CPT® 71275)
- For recurrent hemoptysis (hemoptysis occurring after medical therapy or embolization), or related to pre-bronchial artery embolization planning, the following is considered medically necessary:
  - CTA Chest (CPT® 71275) (preferred) or CT chest with contrast (CPT® 71260) if requested

NOTE:

- CT Chest without contrast, (CPT® 71250), is only warranted in individuals with poor renal function or life-threatening contrast allergy.
- There is no data to support the use of CT Chest without and with contrast, (CPT® 71270) in the diagnosis of hemoptysis.

Evidence Discussion

Hemoptysis is most commonly caused by acute respiratory tract infections, respiratory tract neoplasm, bronchiectasis, and tuberculosis (O'Gurek & Choi, 2022), and clinically unstable (massive) hemoptysis requires immediate stabilization, often in an ICU setting, given the primary risk of asphyxiation rather than exsanguination (Charya et al., 2021; Kathuria et al., 2020). For non-massive hemoptysis, chest x-ray remains a reasonable initial imaging choice, particularly to confirm a benign etiology such as acute bronchitis or pneumonia, though there are no recent studies directly comparing its diagnostic utility to other imaging modalities (Expert Panel on Thoracic Imaging, 2020); CT chest with intravenous contrast, however, is now the established imaging modality for determining the etiology of non-massive hemoptysis and has diagnostic accuracy superior to bronchoscopy for identifying the underlying cause and bleeding site (Expert Panel on Thoracic Imaging, 2020; O'Gurek & Choi, 2022), so CT chest with contrast or CTA chest is considered medically necessary after hemoptysis has started or worsened regardless of chest x-ray findings, including when the chest x-ray is normal (O'Gurek & Choi, 2022). For recurrent hemoptysis or pre-embolization planning, CTA chest is considered medically necessary and preferred over CT chest with contrast because it more precisely localizes bronchial and non-bronchial systemic

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arterial supply, and pre-procedural CT and/or bronchoscopic localization is valuable since angiographic localization alone can be time-consuming, technically challenging, and requires a substantial contrast load, so the choice of arteries to embolize is based on a combination of CT findings, bronchoscopic localization when applicable, and angiographic findings (Charya et al., 2021; Kathuria et al., 2020).

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Bronchiectasis (CH-7)

Guideline

Bronchiectasis (CH-7.1)
Adult Cystic Fibrosis (CH-7.2)
References (CH-7)

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Bronchiectasis (CH-7.1)

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Criteria

- High resolution CT Chest (HRCT) without contrast (CPT® 71250) is considered medically necessary for ANY of the following:
  - To confirm suspected diagnosis of bronchiectasis after an initial x-ray.
  - For known bronchiectasis with worsening symptoms or worsening PFT's.
  - For hemoptysis with known or suspected bronchiectasis. See Hemoptysis (CH-6).

Evidence Discussion

The British Thoracic Society (BTS) recommends performing a baseline chest x ray (CR) in people with suspected bronchiectasis followed by a thin section (< or equal to 1 mm slice thickness) CT scan to confirm the diagnosis (Hill et al., 2019). According to the American College of Radiology (ACR), CR is relatively insensitive but is considered medically necessary and often performed as initial imaging for evaluation of associated conditions and exclusion of diseases that cause similar symptoms (Little et al., 2024). High resolution CT chest (HRCT) is considered the most accurate imaging modality for the diagnosis of bronchiectasis (Ledda et al., 2021). The ACR states that CT chest without contrast is considered medically necessary for suspected bronchiectasis to identify and characterize the severity and distribution of bronchiectasis and to evaluate any associated parenchymal lung diseases (Little et al., 2024). CT chest can help identify an etiology, such as allergic bronchopulmonary aspergillosis, Primary Ciliary Dyskinesia, tracheobronchomegaly, or a foreign body (Hill et al., 2019; Ledda et al., 2021).'

MRI chest for suspected bronchiectasis is not considered medically necessary because it is inferior to CT for evaluating lung parenchyma, and its use is mainly limited to research settings (Little et al., 2024).

CR is often the initial chest imaging exam to evaluate acute conditions in people with bronchiectasis, such as pneumonia or hemoptysis. CT chest without contrast is considered medically necessary for the evaluation of complications and assessing changes in clinical status (Little et al., 2024). CT chest with contrast is considered medically necessary in the setting of a suspected acute infection and associated complication, such as abscess (Little et al., 2024). The BTS recommends a CT chest for people with a deteriorating clinical status, such as worsening symptoms, increased frequency or severity of acute exacerbations, or decreasing lung function (Hill et al., 2019). They recommend a CT chest with contrast if PE is suspected. CTA chest with contrast is considered medically necessary in the setting of hemoptysis to identify

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dilated bronchial arteries or systemic collateral vessels and for pre-procedure planning (Ledda et al., 2021; Little et al., 2024).

High quality evidence in favor of repeated imaging is lacking (Ledda et al., 2021).CR may not show structural changes. Repeat HRCT carries the risk of increased radiation. Individuals with diseases associated with bronchiectasis may be evaluated with CT to help guide therapy and provide prognostic information (Little et al., 2024). The current indication for repeat HRCT is clinical deterioration (Hill et al., 2019).

Bronchiectasis Health Equity Considerations

- Bronchiectasis is more prevalent among females. The most aggressive disease occurs among post-menopausal females.

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Adult Cystic Fibrosis (CH-7.2)

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Criteria

- CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is considered medically necessary for the following (without initial chest x-ray):
  - Suspected or initial diagnosis of Cystic Fibrosis
  - Biennially, (every 2 years), for routine surveillance
  - Persistent respiratory symptoms with reduced lung function despite therapy
  - Exacerbations when chest x-ray is indeterminate
  - Hemoptysis
  - Suspected fungal pneumonia
  - Pre and post-lung transplant evaluation
- See **Bronchiectasis (CH-7.1)**

Evidence Discussion

Imaging is an important method of evaluating the lungs in people with cystic fibrosis (CF). It has a stronger correlation with disease severity than pulmonary function tests and facilitates prompt therapy which may help limit irreversible lung damage (Crowley et al., 2021). Chest x- ray (CR) is less sensitive than CT chest at detecting early structural changes and disease progression (Ciet et al., 2022). However, CR is still most commonly used as the first line imaging examination for the assessment of acute complications due to its low cost, availability, low radiation and speed of acquisition (Murphy et al., 2016). CT is increasingly being used to monitor disease progression and make treatment decisions, but the routine use of CT for short term follow up during pulmonary exacerbations is not recommended due to the risk of a high cumulative radiation dose. Low dose chest CT (LDCT) is useful in individuals with persistent respiratory symptoms and decreased lung function despite appropriate therapy (Ciet et al., 2022). There is little evidence regarding the optimal timing of CT monitoring. The current best clinical practice in several European CF centers is a CT every two years with a radiation dose as low as reasonably achievable (ALARA). Follow up imaging is determined by individual-dependent clinical factors (Ciet et al., 2022). The CF Foundation guidelines for adult CF clinical care recommend CR every 2-4 years in those with a stable clinical status and state that imaging should be considered if there are symptoms or signs of an acute pulmonary exacerbation, pneumothorax, lobar atelectasis or hemoptysis (Yankaskas et al., 2004; Flume et al., 2010).

Several emerging techniques offer promising means of pulmonary imaging using less ionizing radiation, including ultra-low dose CT (ULDCT) and MRI (Crowley et al., 2021;

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Goralski et al., 2021; Hallouch et al., 2022; McBennett et al., 2022). The radiation dose with CR is 0.02mSv, 5.4 mSv for standard dose CT, 1 to 2 mSv for LDCT, and 0.05-0.08mSv for ULDCT. While pulmonary MRI has promise as a means of routinely monitoring CF lung disease, it is currently limited by a lack of availability, high cost, lack of validation and standardized protocols, and the need for sedation or anesthesia in some individuals (Ciet et al., 2022; Crowley et al., 2021).

Adult Cystic Fibrosis Health Equity Considerations

- There are disparities in cystic fibrosis outcomes related to race, ethnicity, socioeconomic status, geographic location, sexuality, and gender identity.
  - People with disadvantaged backgrounds have worse cystic fibrosis health outcomes and tend to die younger than those without.
  - Women tend to have worse cystic fibrosis outcomes than men.

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Bronchitis (CH-8)

Guideline

Bronchitis (CH-8.1)
References (CH-8)

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Bronchitis (CH-8.1)

CH.BH.0008.1.A
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Criteria

- Chest x-ray is considered medically necessary as initial imaging if symptoms persist or worsen. Advanced imaging is not medically necessary for bronchitis unless directed by condition specific guideline.
  - See the following guidelines for additional information:
    - For Pneumonia, see: Pneumonia (CH-13.1).
    - For Cough, see: Cough (CH-3.1).
    - For Pleural Effusion, see: Pleural Effusion (CH-18.1).
    - For pulmonary mass, see: Pulmonary Nodule (CH-16.1), Pulmonary Nodule (CH-16.1).

Evidence Discussion

Acute bronchitis is a self-limited respiratory infection characterized by cough due to acute inflammation of the trachea and large airways without evidence of pneumonia (Braman, 2006; Kinkade & Long, 2016). This syndrome should be distinguished from the common cold, an acute exacerbation of chronic bronchitis and acute asthma (Braman, 2006).

Cough associated with acute bronchitis typically lasts about two to three weeks. Other diagnoses must be considered when cough persists for more than three weeks (Braman, 2006). Acute bronchitis is mainly caused by viruses, and antibiotics are not typically indicated in individuals without chronic lung disease (Braman, 2006; Kinkade & Long, 2016). Imaging is primarily used to rule out pneumonia. Evidence-based guidelines from the American College of Chest Physicians state that imaging is not needed in individuals with acute bronchitis symptoms who have normal vital signs and normal lung examination findings (Kinkade & Long, 2016).

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Asbestos Exposure (CH-9)

Guideline

Asbestos Exposure (CH-9.1)
References (CH-9)

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Asbestos Exposure (CH-9.1)

CH.AE.0009.1.A
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Criteria

- Chest x-ray as radiographic screening for individuals with known or suspected asbestos exposure.
  - Stable asymptomatic calcified pleural plaques on chest x-ray do not require advanced imaging of the chest.
- CT Chest is not considered medically necessary to screen populations at risk for asbestos-related diseases.
- High resolution CT Chest (HRCT) (CPT® 71250) for ANY of the following:
  - Any change seen on chest x-ray
  - Progressive respiratory symptoms that may indicate the development or progression of asbestos related lung disease
- See **Interstitial Disease (CH-11)** for additional information.
- For malignant mesothelioma, See Malignant Pleural Mesothelioma – Suspected/ Diagnosis (ONC-10.1).

Evidence Discussion

Several well-conducted epidemiologic studies of occupationally exposed workers, family contacts of workers, and persons living near asbestos mines have demonstrated that exposure to asbestos is associated with an increased incidence of asbestosis, lung cancer, mesothelioma, as well as other neoplasms. Asbestosis is a fibrotic lung disease caused by accumulation of asbestos fibers in the lungs (Banks et al., 2009; ATSDR, 2011). The diagnosis of asbestosis is most commonly made based on a history of exposure to asbestos, the presence of characteristic radiologic abnormalities, end-inspiratory rales, and other clinical features. The American College of Radiology states that chest radiograph and CT are complementary in the initial workup of suspected occupational lung disease, with chest radiograph's primary role being to exclude alternative diagnoses (Bacchus et al., 2016) (OSHA, 1910.1001 App H; Banks et al., 2009).

A chest x-ray of an individual exposed to asbestos may show pleural plaques, pleural calcifications, pleural fibrosis, or small irregular parenchymal opacities. Lung cancer risk is not elevated among individuals with asbestos-related pleural plaques in the absence of asbestosis.

Low-dose CT (LDCT) is not considered medically necessary as a first-line or standalone screening tool for asbestos-related lung cancer risk. While some literature has

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advocated for expanded lung cancer screening eligibility in select high-risk populations with heavy asbestos exposure, this evidence has limited generalizability, including low screening rates among non-smokers, and there are currently no major society recommendations for routine LDCT screening on the basis of asbestos exposure alone (Markowitz, 2022).

Chest x-ray is considered medically necessary to screen for lung changes resulting from asbestos exposure and is recommended for those who have had relatively heavy exposure to asbestos. However, chest x-rays lack specificity. When a chest x-ray abnormality is indeterminate, High Resolution CT Chest (HRCT) is useful in revealing characteristic parenchymal abnormalities. There is a lack of consensus among experts regarding the value of HRCT for screening of asbestos-related pulmonary disease (Bacchus et al., 2016) (OSHA, 1910.1001 App H; Banks et al., 2009).

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Chronic Obstructive Pulmonary Disease (COPD) (CH-10)

Guideline

COPD (CH-10.1)
References (CH-10)

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COPD (CH-10.1)

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Criteria

- Chest x-ray should be performed initially.
  - CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) can be performed if:
    - Emphysema is known or suspected and a pre-operative study for Lung Volume Reduction Surgery (LVRS) is being requested. OR
    - For known COPD:
      - individuals with persistent exacerbation OR
      - symptoms out of proportion to disease severity OR
      - FEV1 <45% of predicted
    - PFT's, appropriate laboratory studies, and chest x-ray do not reveal a definitive diagnosis and there is suspicion of an additional diagnosis including, but not limited to:
      - Bronchiectasis
      - Sarcoidosis
      - Emphysema
      - Pneumoconiosis
      - Idiopathic pulmonary fibrosis
      - Langerhans cell histiocytosis
      - Hypersensitivity pneumonitis
      - Bronchiolitis obliterans
      - Lipoid pneumonia
      - Drug toxicity
      - Lymphangitic cancer
      - Alpha-1-Antitrypsin Deficiency
- Lung cancer screening is discussed in the following guideline:
  - See "Screening Indications" in **Lung Cancer Screening (CH-33)**
- Pre-interventional lung procedure assessment prior to a planned endobronchial valve (e.g., Zephyr valve) placement
  - See **Pre-Operative Assessment (CH-5.2)**

Evidence Discussion

Chest x-ray (CR) is usually the appropriate initial imaging study for suspected COPD to exclude alternative diagnoses and evaluate for comorbidities and complications

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(Christensen et al., 2024; Global Initiative for Chronic Obstructive Lung Disease [GOLD], 2025; Raoof, Shah, Braman, et al., 2023). CR, pulmonary function tests (PFT's) and selected blood tests lead to a specific diagnosis in a significant proportion of people with chronic dyspnea (Raoof, Shah, Braman, et al., 2023). CT has increased sensitivity and specificity for determining the type, severity, and distribution of emphysema and bronchial abnormalities (Christensen et al., 2024; Raoof, Shah, Braman, et al., 2023). It is an important part of the pre-procedure evaluation process for lung volume reduction surgery, endobronchial valve placement, and lung transplantation (Raoof, Shah, Braman, et al., 2023). The GOLD 2026 report recommends that CT be considered for individuals with COPD with persistent exacerbations and concern for another diagnosis, such as bronchiectasis or an atypical infection, or symptoms out of proportion to the disease severity suggested by PFT's (GOLD, 2025). Some authors have proposed broadening the definition of COPD to include CT-detected emphysema, air trapping or airway wall thickening, even in the absence of airflow obstruction on spirometry (Lowe et al., 2019; Ferrera et al., 2021).

CT is helpful if a smoking-related interstitial lung disease, such as pulmonary Langerhans cell histiocytosis or Combined Pulmonary Fibrosis and Emphysema, is suspected (Cottin et al., 2022; Guiot et al., 2022). It is recommended following a diagnosis of alpha-1 antitrypsin deficiency (Stoller et al., 2006). CT is also used in the evaluation of central airway abnormalities associated with COPD, such as tracheobronchomalacia and excessive dynamic airways collapse (Raoof, Shah, Braman, et al., 2023). Annual lung cancer screening CT's should be performed in current or former smokers who meet the USPSTF criteria, but screening CT's are not recommended for those with COPD not due to smoking because there is insufficient evidence to establish benefit over harm (Raoof, Shah, Braman, et al., 2023).

COPD exacerbations are characterized by dyspnea, cough and/or sputum which worsen over a period of less than two weeks (Raoof, Shah, Braman, et al., 2023). They are mainly caused by respiratory viral infections. CR is often performed to rule out alternative diagnoses, such as pneumonia, pneumothorax or pulmonary edema.

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Interstitial Disease (CH-11)

Guideline

Interstitial Lung Disease (ILD)/Diffuse Lung Disease (DLD) (CH-11.1)
E-cigarette, or Vaping, Product Use–Associated Lung Injury (EVALI) (CH-11.2)
References (CH-11)

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Interstitial Lung Disease (ILD)/Diffuse Lung Disease (DLD) (CH-11.1)

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Criteria

- EITHER high resolution CT Chest (HRCT) without contrast (CPT® 71250) (the diagnostic modality of choice) OR CT Chest with contrast (CPT® 71260) to evaluate for the following:
  - Interstitial changes or diffuse parenchymal changes identified on other imaging (including chest x-ray) (See **Dyspnea/Shortness of Breath (CH-5.1)**
  - In individuals that have pulmonary symptoms with abnormal pulmonary function studies (PFT's) and a normal chest x-ray and there is high clinical suspicion for ILD or DLD, including but not limited to, the following entities: Hypersensitivity Pneumonitis, Cryptogenic Organizing Pneumonia (COP, formally known as BOOP), and Eosinophilic Pneumonia.
  - Initial imaging to identify ILD/DLD in individuals with a high suspicion for connective tissue disease or diagnosis of connective tissue disease (based upon autoantibody testing, serology, etc.), including, but not limited to:
    - rheumatoid arthritis
    - scleroderma
    - idiopathic inflammatory myopathies (polymyositis, dermatomyositis, inclusion body myositis)
    - systemic lupus erythematosus
    - Sjögren's syndrome
    - mixed connective tissue disease
  - Significant exposure to a substance or medication (linked to ILD/DLD) and concern for:
    - Asbestosis
    - Silicosis
    - Coal miner's lung disease
    - Drug induced pulmonary toxicity including pneumonitis
      - Follow-up CT chest (CPT® 71250 or CPT® 71260) for worsening symptoms or PFT's, guide for steroid taper, or baseline prior to re-exposure to offending agent
      - Timing at the discretion of the treating provider
  - Radiation-induced lung injury

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        - Follow-up imaging as requested by the treating provider.
        - For follow-up imaging of the primary cancer, see relevant section in the Oncology guidelines
    - At any time for detection of Progressive Pulmonary Fibrosis (PPF), in individuals with ILD of known or unknown etiology, defined by at least one of the following:
        - New or worsening respiratory symptoms
        - Worsening PFT's, defined as decline of either:
            - FVC of 5% or greater within the past year
            - DLCO of 10% or greater within the past year
    - Annually in individuals with known pulmonary fibrosis if needed for:
        - serial examination for improvements in diagnostic accuracy, or
        - evaluation of disease reversibility, stability, or progression.
- Concern for interstitial lung disease post-COVID, See **Coronavirus Disease 2019 (COVID-19) (CH-13.2)**
- HRCT can be done even if a regular CT Chest has been done previously. HRCT is done with a thinner-slice protocol that can provide additional details to help determine ILD subtype.
- HRCT can also be done with inspiratory/expiratory and supine/prone views.

Evidence Discussion

DLD refers to diffuse parenchymal lung diseases or interstitial lung diseases. There are a multitude of pathologies that demonstrate involvement of the alveoli, airways, or both, in addition to the pulmonary interstitium. A single term of ILD would not fully address the entities that are mostly parenchymal in nature, hence the term Diffuse Lung Disease is more technically correct. Both terms are included here for convenience and recognition (Montesi et al., 2020)

ILD is often suspected in those with chronic dyspnea or non-productive cough, especially in the setting of an inhalational exposure or systemic disease known to be associated with lung involvement (Cox et al., 2020; Hobbs et al., 2021; Joy et al., 2023). Chest x-ray (CR) and CT chest without contrast are considered medically necessary for suspected ILD and provide complementary information (Cox et al., 2020; Hobbs et al., 2021). A normal CR does not rule out ILD, as CR can be normal in up to 10% of individuals with ILD. Its primary function is to evaluate for an alternative diagnosis. CR remains an important imaging modality to screen for occupational lung disease (Cox et al., 2020). High resolution CT (HRCT) has higher sensitivity and specificity for ILD. HRCT may help guide a biopsy site or provide a definitive diagnosis, making a biopsy unnecessary (Cox et al., 2020; Hobbs et al., 2021). CT can provide prognostic information: individuals with honeycombing or a usual interstitial pneumonia (UIP) pattern on CT have increased mortality (Montesi et al., 2020).

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There is no relevant literature to support the use of CT with IV contrast for initial or follow-up imaging of ILD; however, IV contrast may be of use in evaluation of alternative diagnoses with overlapping clinical features or conditions that also involve the pleura, mediastinum, and pulmonary vessels (Hobbs et al., 2021)

CR and CT chest without contrast are considered medically necessary for evaluation of an acute exacerbation of ILD. They can help exclude alternative causes for worsening clinical symptoms and confirm abnormalities consistent with progression of ILD. There are no data to support routine surveillance imaging of ILD, but serial CT's can improve diagnostic accuracy and evaluate disease stability, reversibility or progression (Hobbs et al., 2021). The optimal interval for follow up HRCT to determine disease progression in idiopathic pulmonary fibrosis (IPF) is unknown. Raghu et al recommend consideration of an annual HRCT in people with IPF if there is clinical suspicion of worsening fibrosis or to screen for complications such as lung cancer (Hobbs et al., 2021). In people with an ILD other than IPF and radiologic evidence of fibrosis, disease progression on HRCT is one of three criteria used to define progressive pulmonary fibrosis Raghu et al., 2022; Wong et al., 2020).

Progression of fibrosis is typically assessed visually, relying on the percentage of lung volume containing fibrotic features in the upper, mid, and lower lung zones. An increased extent of fibrotic features denotes progression. These may include increased traction bronchiectasis and bronchiolectasis, new ground-glass opacity with traction bronchiectasis, new fine reticulation, increased coarseness of reticular abnormality, new or increased honeycombing, and increased lobar volume loss (Wong et al., 2020)

Drug-induced pulmonary toxicity is a diagnosis of exclusion, supported by temporal association with an implicated agent, exclusion of infection, cardiogenic edema, and progression of the underlying disease, and by improvement after the agent is withdrawn (Skeoch et al., 2018; Bridi et al., 2024). No CT pattern is specific to a given drug, and reported patterns include nonspecific interstitial pneumonia, organizing pneumonia, hypersensitivity pneumonitis, eosinophilic pneumonia, and diffuse alveolar damage, so HRCT is the modality of choice for initial characterization (Skeoch et al., 2018; Hobbs et al., 2021). Follow-up CT is used to assess worsening symptoms or pulmonary function, to guide corticosteroid taper, and to establish a baseline before planned re-exposure to the offending agent, with timing determined by the treating provider (Bridi et al., 2024).

Radiation-induced lung injury is referenced to the radiation therapy completion date, with an acute exudative phase at approximately 4 to 12 weeks, a proliferative phase at approximately 3 to 9 months, and fibrosis typically after 9 months, though evolution may continue up to 2 years (Benveniste et al., 2019).CT chest (CPT® 71250 or CPT® 71260) depicts radiation damage before it is evident at radiography, and the characteristic finding is opacity confined to the radiation portal with a sharp non-anatomic margin (Benveniste et al., 2019),Follow-up imaging may be obtained at the

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discretion of the treating provider; for surveillance of the treated malignancy itself, see the relevant section in the Oncology guidelines.

Interstitial lung abnormalities (ILA) are abnormalities on CT suggestive of ILD in people without a prior clinical diagnosis (Hunninghake et al., 2022; Hatabu et al., 2020). They are common incidental findings, especially in older people. ILA are a radiologic observation. Differentiation between ILA and clinical or subclinical ILD must be on the basis of a clinical evaluation. When respiratory signs/symptoms or functional impairment is present, ILA likely represent mild ILD. The morphology and distribution of ILA are important: subpleural fibrotic ILA are most likely to progress. There is minimal evidence to support a specific management plan for ILA. Hatabu et al recommend that when ILA are detected, a dedicated HRCT chest can help confirm and characterize the abnormalities, especially if the initial scan was incomplete (i.e., a CT abdomen) or not performed with thin sections. Hunninghake et al recommend that a HRCT should be done in those with ILA. If clinically significant ILD is ruled out, Hatabu et al recommend a repeat CT at 12-24 months for those with subpleural fibrotic ILA or other risk factors for progression to ILD (Hatabu et al., 2020). However, participants in a consensus survey disagreed about repeating a HRCT at the follow up evaluation (Hunninghake et al., 2022; Hatabu et al., 2020). People with nonfibrotic nonsubpleural ILA and no symptoms or physiologic impairment do not need reimaging (Hatabu et al., 2020; Tomassetti et al., 2022).

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E-cigarette, or Vaping, Product Use–Associated Lung Injury (EVALI) (CH-11.2)

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Criteria

- Chest x-ray is considered medically necessary as first line imaging for suspected EVALI.
- CT Chest with or without contrast (CPT® 71250 or CPT® 71260) is considered medically necessary if:
  - Clinical suspicion for EVALI but negative chest x-ray
  - To identify extent of pulmonary involvement identified on chest x-ray
  - Severe (e.g., tachycardia, tachypnea, or hypoxia (O_2 95% or less)) or worsening disease (does not require a repeat chest x-ray)
  - To rule out other diagnoses (infection, pulmonary edema, etc.)
  - Clinical suspicion of pneumothorax or pneumomediastinum (See **Pneumothorax/ Hemothorax (CH-19.1**))

Evidence Discussion

EVALI is a toxic inhalational acute lung injury with imaging and histopathologic patterns of organizing pneumonia and/or diffuse alveolar damage (Kligerman et al., 2020; Friedman et al., 2022). Individuals with EVALI mainly present with respiratory symptoms (e.g., shortness of breath, cough, chest pain), gastrointestinal symptoms (e.g., abdominal pain, diarrhea, nausea, vomiting), and systemic symptoms (e.g., fever, weight loss, fatigue) (Garg et al., 2022). The diagnostic criteria for EVALI, as defined by the CDC for a "confirmed EVALI" case, is as follows: i) individuals must have vaped within 90 days before the onset of symptoms, ii) bilateral pulmonary opacities on chest imaging, iii) a negative evaluation for infection, iv) no other plausible alternative diagnoses (Garg et al., 2022). Chest x-ray (CR) can exclude other diagnoses and is often the first imaging study. CR is not abnormal at initial assessment in all individuals with EVALI. When pulmonary abnormalities are not identified on CR or when further characterization of CR findings are needed to evaluate for another potential cause of symptoms, CT chest can be obtained (Kligerman et al., 2020; Friedman et al., 2022).

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Pneumonia and Coronavirus Disease 2019 (COVID-19) (CH-13)

Guideline

Pneumonia (CH-13.1)
Coronavirus Disease 2019 (COVID-19) (CH-13.2)
References (CH-13)

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Pneumonia (CH-13.1)

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Criteria

- Chest x-ray should be performed initially in all individuals with suspected pneumonia, prior to considering advanced imaging.
  - CT Chest without or with contrast (CPT® 71250 or CPT® 71260) if initial or repeat chest x-ray findings reveal:
    - complication of pneumonia (e.g., abscess, effusion, necrotizing pneumonia, pneumothorax)
    - possible lung mass associated with the infiltrate or persistent radiographic abnormalities on repeat chest x-ray at or after 6 weeks
    - Follow-up CT Chest without or with contrast is medically necessary for:
      - inappropriate response to therapy
      - persistent symptoms
      - after completion of therapy
      - pneumonia or a complication of pneumonia initially detected only on CT
    - follow-up CT chest is not considered medically necessary when pneumonia was initially detected on chest x-ray, the individual has demonstrated appropriate clinical improvement, and a repeat chest x-ray shows resolution of the infiltrate.
  - CT Chest without or with contrast (CPT® 71250 or CPT® 71260) for hypoxia and/ or respiratory distress
  - CT Chest without or with contrast (CPT® 71250 or CPT®71260) after initial chest radiograph is negative or equivocal and one of the following:
    - Abnormal vital signs (including hypoxemia, pulse > 100, respiratory rate > 24, fever > 100)
    - Abnormal exam (including respiratory distress, dyspnea and or abnormal lung auscultation)
    - Advanced age (age >75), or other significant comorbidities
- If pulmonary emboli suspected, see **Pulmonary Embolism (CH-25.1).**
- If pneumonia or a complication of pneumonia is only initially detected on CT Chest without or with contrast (CPT 71250 or CPT 71260), a follow up CT Chest without or with contrast (CPT 71250 or CPT 71260) is considered medically necessary.
- CT Chest without or with contrast (CPT® 71250 or CPT® 71260) for immunocompromised individuals with any of the following:
  - High suspicion for pneumonia despite equivocal or negative chest x-ray
  - Persistent radiographic abnormalities on repeat imaging after 6-12 weeks

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- Multiple or diffuse opacities or nodules

Evidence Discussion

Chest radiography (CR) is the appropriate first imaging modality in the evaluation of suspected pneumonia. The American Thoracic Society (ATS) and the Infectious Diseases Society of America (IDSA) define a clinical diagnosis of pneumonia as symptoms and signs of pneumonia with radiographic confirmation (Metlay et al., 2019). Chest radiographs should be performed for individuals with symptoms of dyspnea, tachycardia, tachypnea and fever more than 100°F or lung findings suggestive of pneumonia (Kinkade & Long, 2016).

CT is more accurate/sensitive than CR and may be considered medically necessary when there is a high clinical suspicion for pneumonia (typical or atypical) and a delay in diagnosis could be life threatening.

CT chest without contrast is considered medically necessary and CT chest with contrast may be considered medically necessary in immunocompromised people with an acute respiratory illness and a normal/equivocal/nonspecific CR or a CR that demonstrates multiple, diffuse or confluent opacities (Lee et al., 2019).

MRI is considered not medically necessary for the imaging of pneumonia (Batra et al., 2024; Lee et al., 2019). MRI has a potential role for follow up imaging of parenchymal (Chest wall/mediastinal) disease, but CT is more sensitive and is preferred (Lee et al., 2019).

Ultrasound chest may be appropriate for the evaluation of parapneumonic effusions. It can also be used to guide pneumonia-related interventions (Batra et al., 2024; Desai et al., 2024; Boccatonda et al., 2023; Chhetri et al., 2022).

Routine use of follow up chest imaging in adults who are improving and whose symptoms have resolved within 5-7 days is not recommended by the ATS/IDSA (Metlay et al., 2019). Repeat CR or CT after the completion of therapy is generally reserved for high risk individuals, suspected complications, disease progression or when the clinical course differs from CR interpretation (Dueck et al., 2021; Lampichler, 2017). High risk individuals include individuals over the age of 50, smokers, and those with persistent symptoms (Little et al., 2013; Tang et al., 2011). For immunocompetent individuals with suspected pneumonia, follow-up imaging within 6-12 weeks is considered medically necessary to confirm resolution. The follow-up imaging modality should be the same modality in which pneumonia was detected (Batra et al., 2024).This is consistent with modality-matched follow-up: when the original detection modality was chest x-ray and a repeat x-ray confirms resolution, escalation to CT is not indicated absent one of the specific criteria above (complication, persistent abnormality at 6 weeks, or high-risk features) (Batra et al., 2024; Metlay et al., 2019; Little et al., 2013; Tang et al., 2011).

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Pneumonia Health Equity Considerations

Mortality from pneumonia is higher in non-Hispanic Black individuals than non-Hispanic White individuals. These disparities are the greatest in major metropolitan areas.

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Coronavirus Disease 2019 (COVID-19) (CH-13.2)

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Criteria

- CT Chest without contrast (CPT®71250), or with contrast (CPT®71260) is considered medically necessary in the following clinical situations:
  - Imaging for initial diagnosis:
    - Symptomatic COVID-19 positive individuals with underlying comorbidities (including, but not limited to, age > 65 years, chronic lung disease, current or former smoker, chronic kidney disease, chronic liver disease, dementia, diabetes, Down's syndrome, HIV or other primary, secondary or acquired immunodeficiency, mood disorders, BMI ≥30, pregnancy, solid organ or blood stem cell transplant, cerebrovascular disease, substance use disorder, tuberculosis, cardiovascular disease, malignancy, bronchopulmonary dysplasia, chronic infections, or immunocompromised state).
    - Moderate to severe symptomatic individuals with evidence of significant pulmonary dysfunction or damage (e.g., hypoxemia, moderate-to-severe dyspnea), suspected of having COVID-19, regardless of COVID-19 test results or when viral testing is not available, even with a normal chest x-ray (if done).
    - Thromboembolic complications including pulmonary embolism, stroke and mesenteric ischemia are recognized complications of COVID-19. See **Pulmonary Embolism (CH-25.1)**, **Mesenteric Ischemia (AB-6.1)** in the Abdomen Imaging Guidelines, and **Stroke/TIA (HD-21.1)** in the Head Imaging Guidelines for appropriate imaging guidance.
    - Other systemic complications are being recognized as medical knowledge about this condition evolves. Imaging for possible COVID-19 complications should be managed by the appropriate condition based guidelines.
  - Imaging after initial diagnosis:
    - Imaging in the following clinical circumstances:
      - If there is significant worsening of symptoms in a COVID-19 positive individual and imaging will be used to modify individual management.
      - A recovered COVID-19 positive individual with significant residual functional impairment (persistent or worsening respiratory symptoms),and/or persistent hypoxemia.

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- Symptomatic post-COVID individuals with concern for interstitial lung disease including organizing pneumonia imaging can be considered pre and post treatment.

Evidence Discussion

Chest imaging is considered not medically necessary as a screening test for COVID-19 in asymptomatic people or in people with suspected COVID-19 and mild clinical features unless they are at risk for disease progression (Rubin et al., 2020).

The American College of Radiology (ACR) states that CT chest should not be used as a screen or first-line test to diagnose COVID-19 (American College of Radiology, 2020). Viral testing is the only specific method of diagnosis and confirmation with a viral test is required even if radiologic findings on chest radiography (CR) or CT are suggestive of COVID-19.

Imaging is considered medically necessary in people with COVID-19 and a worsening respiratory status or in people who have suspected COVID-19, a high pretest probability of disease, and moderate to severe clinical features (Rubin et al., 2020). Although less sensitive than CT, chest radiography (CR) is typically the first line imaging modality (Batra et al., 2024; Rubin et al., 2020; Long et al., 2022).

Johnston et al have proposed a management algorithm for individuals with COVID-19 pneumonia which recommends a clinical assessment with CR and PFT's 3-6 months after discharge (Johnston et al., 2023). Performance of a high resolution CT chest (HRCT) is based on risk factors (ICU admission, noninvasive or mechanical ventilation; male sex; age > 60) and serial assessment of lung function and symptoms.

There is an increased risk of pulmonary embolus (PE) in people with COVID-19, including both microvascular/ in situ thrombosis and macrothrombotic events (Ortega-Paz et al., 2023). It is currently recommended that the same diagnostic strategy and the same D-dimer threshold be used for people with COVID-19 and suspected PE as in those without COVID-19 (Ortega-Paz et al., 2023; Suh et al., 2021).

Background and Supporting Information

- Major professional society guidelines to date:
  - The American College of Radiology (ACR) recommends that CT Chest should not be used for screening or as a first-line test to diagnose COVID-19 (American College of Radiology, 2020).
  - The Centers for Disease Control and Prevention (CDC) recommends viral testing as the only specific method of diagnosis (Centers for Disease Control and Prevention, 2021).
  - The CDC has stated that symptoms may appear 2-14 days after exposure to the virus. These symptoms may include:

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    - fever or chills
    - cough
    - shortness of breath or difficulty breathing
    - fatigue
    - muscle or body aches
    - headache
    - new loss of taste or smell
    - sore throat
    - congestion or runny nose
    - nausea or vomiting
    - diarrhea
  - The Fleischner Society consensus statement published on April 7, 2020, recommends against the use of imaging in individuals with suspected COVID-19 who are either asymptomatic or have only mild symptoms without evidence of significant pulmonary dysfunction or damage (e.g., absence of hypoxemia, no or mild dyspnea) (Rubin et al., 2020).
  - According to The American Society of Transplantation, screening donors is based on methods below. Screening donors encompasses three different methods (American Society of Transplantation, 2023).
    - Epidemiologic screening for travel and potential exposures
    - Screening for symptoms suggestive of COVID-19
    - Viral testing (nucleic acid testing of specimens)
    - Screening asymptomatic donors with advanced imaging is considered not medically necessary.

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Other Chest Infections (CH-14)

Guideline

PPD or TB (Mycobacterium tuberculosis and Nontuberculous Mycobacterial Pulmonary Disease (NTM-PD)) (CH-14.1)
Fungal Infections (Suspected or Known) (CH-14.2)
Wegener's Granulomatosis/Granulomatosis with Polyangiitis and Related Entities (CH-14.3)
Suspected Sternal Dehiscence (CH-14.4)
References (CH-14)

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PPD or TB (Mycobacterium tuberculosis and Nontuberculous Mycobacterial Pulmonary Disease (NTM-PD)) (CH-14.1)

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Criteria

- CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) with ANY of the following:
  - Normal or equivocal chest x-ray with ONE of the following:
    - Positive PPD skin test or other positive tuberculin skin tests OR
    - Positive QuantiFERON-TB Gold OR
    - Suspected active (or reactivated) tuberculosis
  - Suspected NTM-PD (i.e., atypical mycobacterium infection, Mycobacterium avium complex (MAC))
  - If CT Chest is unremarkable, there is insufficient data to support performing subsequent CT Chest unless symptoms develop or chest x-ray shows a new abnormality.
  - Suspected complications or progression of tuberculosis (e.g., pleural tuberculosis, empyema, and mediastinitis)
  - For those with known TB, follow-up CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) with frequency at the discretion of or in consultation with the pulmonary or infectious disease specialist (not to exceed 3 studies in 3 months).
  - Re-evaluate individuals undergoing active treatment who had abnormalities seen only on CT Chest.

Evidence Discussion

Nontuberculous mycobacterial pulmonary disease (NTM-PD) can be caused by a wide array of pathogens, with the most common including Mycobacterium avium complex (MAC), Mycobacterium kansasii, Mycobacterium xenopi, and Mycobacterium abscessus.

Chest radiography (CR) should be the initial imaging for suspected active M. tuberculosis (MTB) infection based on clinical symptoms and demographics, a newly positive tuberculin skin test (TST), or interferon-gamma release assay (IGRA). CT is medically necessary if CR is equivocal and there is clinical suspicion of active MTB, especially in those with impaired cell-mediated immunity (Wetscherek et al., 2022; Anjos

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et al., 2020). CT may be performed to evaluate suspected complications and monitor response to therapy (Nel et al., 2022; Batra et al., 2024).

CR is medically necessary to distinguish latent from active MTB in people with evidence of new exposure (a newly positive TST/IGRA or a positive TST/IGRA with unknown prior status) but no clinical symptoms (Ravenel et al., 2017).The yield of CR for active MTB in the absence of clinical symptoms is low. CT is more sensitive than CR for the detection of latent TB (Ravenel et al., 2017; Piccazzo et al., 2014). CT is recommended when CR is equivocal for active MTB or when a diagnosis of latent MTB may affect future care (Ravenel et al., 2017; Piccazzo et al., 2014).

When a TST is not available for people who are going to live in a group home, correctional institution or nursing facility, CR is medically necessary as a surrogate screening measure.

Imaging (CR and CT) is an important component in the diagnosis and follow up of nontuberculous mycobacterial pulmonary disease (NTM-PD) (Lipman et al., 2020). The diagnosis and determination of response to therapy are based upon radiologic, clinical, and microbiologic criteria (Daley et al., 2020; Haworth et al., 2017). Serial CT imaging is important for monitoring disease progression and response to therapy. Radiologic findings provide prognostic information and may affect treatment recommendations (Daley et al., 2020; Haworth et al., 2017).

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Fungal Infections (Suspected or Known) (CH-14.2)

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Criteria

- CT Chest with contrast (CPT® 71260) or High resolution CT Chest (HRCT) without contrast (CPT® 71250):
  - Initial diagnosis of any fungal pneumonia or chest infection
  - Suspected complications or progression of the fungal chest infection (e.g., worsening pneumonitis; pleural effusion, empyema, mediastinitis)
  - Suspected Allergic Bronchopulmonary Aspergillosis (ABPA) in asthmatics with atypical presentation or poor response to conventional therapy
- Follow-up CT Chest with contrast (CPT® 71260) or High Resolution CT Chest (HRCT) without contrast (CPT® 71250) with frequency at the discretion of or in consultation with the pulmonary or infectious disease specialist.
- For suspected fibrosing mediastinitis:
  - CT chest with contrast (CPT® 71260) (preferred imaging) OR
  - MRI Chest without and with contrast (CPT® 71552)
  - CTA chest (CPT® 71275) for:
    - Procedural planning
    - Evaluation of vascular stents

Evidence Discussion

Pulmonary fungal infections can be caused by a wide array of pathogens, including the endemic mycoses (Histoplasma species, Blastomyces species, and Coccidioides species), Cryptococcus species, and Aspergillus species.

CT chest is the imaging method of choice for suspected or known pulmonary fungal infections, especially in immunocompromised hosts (Alexander et al., 2021; Lewis et al., 2023; Azar, 2024). Imaging findings are not specific but can lead to early detection of infection, help direct further diagnostic procedures and narrow the differential diagnosis (Walker et al., 2014; Lewis et al., 2023). CT is also used to monitor response to therapy and identify complications. The diagnosis of certain pulmonary fungal infections and determination of response to treatment require a combination of clinical, microbiologic and radiologic criteria (Van Braeckel et al., 2022; Setianingrum et al., 2019; Denning et al., 2016). Denning et al recommend follow up imaging 3-6 months after starting anti-fungal therapy for chronic pulmonary aspergillosis, then less frequently, or with any

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major change of clinical status based on the fact that radiologic change is slow and little change is visible on chest X-ray (CR) or CT in less than 3 months (Denning et al., 2016).

CT is considered not medically necessary in the routine evaluation of suspected asthma without a specific indication but may be of value to identify acute complications following a nondiagnostic CR with suspected alternative diagnoses or associated conditions, such as allergic bronchopulmonary aspergillosis (Ash & Diaz, 2017; Richards et al., 2016; Godet et al., 2024; Agarwal et al., 2022). Serological assays can also play a role in the diagnosis of invasive pulmonary aspergillosis, including the galactomannan and beta-d glucan (Fungitell) assays.

Fibrosing mediastinitis (FM) is a rare benign but potentially life threatening process characterized by progressive proliferation of dense infiltrative fibrous tissue in the mediastinum and/or hila. Granulomatous FM is the more common subtype in the US and is typically associated with prior infection with histoplasmosis. Nongranulomatous FM is less common and is usually associated with an autoimmune disorder, drug exposure, or prior radiation. The most common symptoms are cough, dyspnea, hemoptysis, and pleuritic chest pain. Individuals may develop SVC syndrome or post-obstructive pneumonia. Widening of the mediastinum and mediastinal/hilar lymphadenopathy are the most common abnormal findings on chest x-ray. CT chest with contrast is the modality of choice for suspected FM. MRI is equivalent to CT for evaluating extent of disease, but CT is superior for evaluation of airways and calcification. PET CT is nonspecific and not routinely used. Nonsurgical and surgical procedures for individuals with clinical symptoms are related to compression or obstruction of mediastinal structures. CTA chest may be used for procedural planning or to evaluate the patency of vascular stents. There are no consensus guidelines for follow up imaging. No routine imaging is considered medically necessary for the granulomatous subtype unless there are progressive symptoms or clinical decompensation. Regular surveillance with CT is recommended for the nongranulomatous subtype to rule out malignancy which may not have been sampled in a biopsy (Garrana et al., 2019)

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Wegener's Granulomatosis/ Granulomatosis with Polyangiitis and Related Entities (CH-14.3)

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- See **Small Vessel Vasculitis (PVD-6.11)** for concerns of Wegener's Granulomatosis and Related Entities in Peripheral Vascular Disease imaging guidelines.

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Suspected Sternal Dehiscence (CH-14.4)

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Criteria

- Sternal wound dehiscence is primarily a clinical determination.
- Chest x-ray is performed prior to advanced imaging to identify abnormalities in the sternal wire integrity and/or a midsternal stripe. Other findings include rotated, shifted, or ruptured wires.
- CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) for:
  - differentiating sternal wire migration from sternal dehiscence
  - planned debridement and/or repair

See **Infection (MS-9.0)** for concerns for osteomyelitis or soft tissue infection.

Evidence Discussion

Sternal dehiscence is defined as sternal separation with intact sternal wires migrating with a displaced sternal fragment (Hota et al., 2018). The diagnosis is often made clinically; however, early signs may be subtle, and it may be clinically occult.. Early detection of sternal dehiscence on chest x-ray (CR) is important (Hota et al., 2018). CT may be used in equivocal cases to assess for sternal separation or for preoperative planning (Hota et al., 2018; Silverborn et al., 2022; Shirke et al., 2024).

CT provides the best evaluation of sternal non-union when suspected based on pain, clicking and clinical evidence of sternal instability for > 3 months in the absence of infection (Hota et al., 2018).

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Sarcoid (CH-15)

Guideline

Sarcoid (CH-15.1)
References (CH-15)

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Sarcoid (CH-15.1)

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Criteria

- CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) is considered medically necessary to:
  - Establish or rule out the diagnosis when suspected
- Subsequent CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250), in known sarcoidosis, for ANY of the following:
  - Development of worsening symptoms
  - New symptoms appear after a period of being asymptomatic
  - Treatment change is being considered
- If CT is equivocal, definitive diagnosis can only be made by biopsy.
- PET/CT should not be used in the standard work-up of all sarcoidosis individuals. There is currently no evidence to support the use of PET/CT for screening.
- PET/CT (CPT® 78815) is considered medically necessary under the following conditions:
  - Help guide biopsy location if:
    - known lesion on CT Chest is difficult to access, to help identify alternative biopsy location
    - no apparent lung involvement and to identify an extrapulmonary biopsy site
  - Differentiation of reversible granulomatous disease from irreversible pulmonary fibrosis and will affect treatment options
  - Help identify treatment failure where either current treatment will be modified or new treatment will be introduced
- For evaluation of suspected or known cardiac sarcoidosis, see Sarcoid (CH-15.1).

Evidence Discussion

Sarcoidosis is a multisystem disease of unknown etiology characterized by the formation of noncaseating granulomas in various organs (Sève et al., 2021). The diagnosis is based on three major criteria: a compatible clinical presentation, the finding of nonnecrotizing granulomatous inflammation in a tissue sample, and the exclusion of alternative causes of granulomatous disease (Crouser et al., 2020). Imaging plays an important role in the diagnosis. Although chest x-ray (CR) is often the first imaging test used, high resolution chest CT (HRCT) is more sensitive than CR for the detection of nodules and subtle fibrosis (Sève et al., 2021). Histologic examination of tissue remains the gold standard for reaching a definitive diagnosis (Tana et al., 2020). However, in the appropriate clinical context, certain patterns of mediastinal and

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parenchymal involvement on HRCT are virtually diagnostic of sarcoidosis (Tana et al., 2020). The American Thoracic Society (ATS) states that if asymptomatic bilateral hilar lymphadenopathy is found on chest imaging, histologic confirmation is not always required (Tana et al., 2020; Crouser et al., 2020).

The monitoring of individuals with pulmonary sarcoidosis is not standardized. Changes in imaging along with clinical features have been used to assess changes in disease activity (Keijsers & Grutters, 2020). If spirometry and pulmonary symptoms are worsening, additional chest imaging may be useful to detect progression of pulmonary disease or an alternative diagnosis (Gupta et al., 2022). HRCT can also provide prognostic information by differentiating reversible from irreversible (i.e., fibrotic) lesions and show complications, such as mycetomas or evidence of pulmonary hypertension (Tana et al., 2020).

There is interest in the use of FDG PET CT for the diagnosis and monitoring of sarcoidosis. PET CT may reveal a more easily accessible biopsy site which is not clinically evident (Sève et al., 2021; Keijsers & Grutters, 2020). It may detect multi-organ and/or extra-thoracic involvement and demonstrate active inflammation not easily recognized by physical exam or other methods (Keijsers & Grutters, 2020; Vender et al., 2022). Studies have shown that FDG uptake in sarcoidosis represents active granulomatous inflammation (Keijsers & Grutters, 2020). The evaluation of disease activity is valuable when there is doubt regarding the activity of lesions and a change in therapy is being considered (Tana et al., 2020). Positive scans should be interpreted with caution, however, because FDG uptake can be present in other inflammatory processes and malignancy. A significant correlation between decreased metabolic activity in the lungs, increased pulmonary function tests and improved symptoms in response to immunosuppressive medication has been demonstrated (Keijsers & Grutters, 2020; Vender et al., 2022). Most of the data regarding PET CT and sarcoidosis come from retrospective studies. Prospective trials are needed to determine the role of PET CT in monitoring the efficacy of therapy and the importance of abnormal PET CT's in asymptomatic individuals (Vender et al., 2022). The threshold SUV that distinguishes active disease from fibrosis has not been determined. Few studies have compared the value of HRCT vs PET CT for diagnosis. Data on appropriate time intervals for follow up assessments and the role of PET-guided therapy are scarce (Vender et al., 2022).

Sarcoid Health Equity Considerations

- Sarcoidosis occurs 2.5 times more often in Black individuals and females.
- Individuals who are Black, female, and/or have a low socioeconomic status report lower health-related quality of life, as well as increased rates of symptoms, mortality, and hospitalizations related to sarcoidosis.

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- The unequal distribution of care and resources between rural/urban locations and different states may impact the quality of care and health outcomes related to sarcoidosis.

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Solitary Pulmonary Nodule (SPN) (CH-16)

Guideline

Solitary Pulmonary Nodule (CH-16.0)
Solitary Pulmonary Nodule – Imaging (CH-16.1)
Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)
Interval Imaging Outcomes (CH-16.3)
PET (CH-16.4)
References (CH-16)

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Solitary Pulmonary Nodule (CH-16.0)

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- For Lung Cancer Screening (LDCT) including incidental findings from LDCT, See **Lung Cancer Screening (CH-33)**

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Solitary Pulmonary Nodule – Imaging (CH-16.1)

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Criteria

- For these guidelines, manual nodule measurements should be based on the average of long- and short-axis diameters. The size threshold (<6mm) corresponds to a rounded measurement of 5mm or less in these guidelines. Measurements should be rounded to the nearest millimeter. Prediction models used to estimate malignancy yield better results with the average diameter than with the maximum transverse diameter. The dimension of small pulmonary nodules (<10mm) should be expressed as the average of the maximal long-axis and perpendicular maximal short-axis measurements in the same plane. For larger nodules and for masses larger than 10mm, it is generally appropriate to record both long- and short-axis dimensions, with the long-axis dimension being used to determine the T factor in lung cancer staging and being a criterion for tumor response to treatment.
- A pulmonary nodule can be determined to have changed in size when its average diameter has increased or decreased by at least 2mm (rounded to the nearest millimeter). Smaller changes do not reliably indicate change.
- Maximum intensity projection (MIP), and Minimum intensity projection (MinIP) are 2D projections of the volumetric (3D) acquisition data. These projections may be of use in evaluation of pulmonary nodules, but these projections are included in the cross sectional imaging base codes, and is not separately reimbursable.
- EITHER CT Chest with contrast (CPT® 71260) OR CT Chest without contrast (CPT® 71250) is considered medically necessary initially for discrete nodule(s) in the following scenarios (Gould et al., 2013; MacMahon et al., 2017; Martin et al., 2023):
  - Lung nodule(s) seen on an imaging study other than a “dedicated” CT or MRI Chest. Examples of other studies:
    - Chest x-ray
    - CT abdomen
    - MRI spine
    - Coronary CTA (unless full lung field are noted to be included)
  - But NOT in the following which are considered initial dedicated advanced chest imaging:
    - CT Chest without and with contrast (CPT® 71270)
    - Low-dose computed tomography (LDCT) (CPT® 71271)
    - CTA Chest (CPT® 71275)

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    - MRI Chest without contrast (CPT® 71550)
    - MRI Chest without and with contrast (CPT® 71552)
    - MRA Chest without and with contrast (CPT® 71555)
- Comparisons should include the earliest available study and the more recent previous CT Chest scans to determine if nodule was present and stable.
    - Similar-sized pleural nodule(s) is treated as a pulmonary nodule(s)
- The size of the lung or pleural nodule(s) is crucial information for decisions making regarding follow-up. The largest of multiple lung and/or pleural nodules will guide the surveillance interval. (See **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)**, and **Pleural-Based Nodules and Other Abnormalities (CH-17.1)**).
- A lung nodule is defined as an approximately rounded opacity (more or less well-defined) measuring up to 3cm in diameter.
    - Rounded lesions measuring more than 3 cm in diameter are termed lung masses and should be considered indicative of lung cancer until histologically proven otherwise. The approach to lung masses differs from that of nodules, and these guidelines are specifically for abnormalities occurring within the chest that meet the definition of a pulmonary nodule or nodules.
- These criteria are not intended for use in the following groups:
    - Individuals aged 35 years or younger
        - Considered to have an overall low risk for pulmonary malignancy
        - In this age group, nodules are most likely to be infectious rather than cancer
        - Management of incidentally found pulmonary nodules in this group should be individualized
    - Known primary cancer with risk for metastases
        - Imaging should follow the recommendations in the applicable oncology imaging guideline.
    - Immunocompromised individuals at risk for infection
        - Evaluation should be based on the suspected underlying condition, including possible fungal or other opportunistic infection. See the applicable infectious or inflammatory chest imaging guideline, including Fungal Infections (CH-14.2), when appropriate.

Evidence Discussion

A pulmonary nodule is defined as a well- or poorly defined rounded opacity <3cm in diameter. Focal pulmonary lesions >3cm are considered masses. Nodule measurement is currently determined by standard linear measurement with electronic calipers. Measurements and averages should be expressed to the nearest whole millimeter. The dimension of small pulmonary nodules (<10mm) should be expressed as the average of

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the maximal long-axis and perpendicular maximal short-axis measurements in the same plane. For larger nodules and masses, both long- and short-axis dimensions should be recorded (Bankier et al., 2017).

Semi-automated nodule volumetry has superior sensitivity for detecting growth and is recommended as the preferred method by the British Thoracic Society (BTS), but it requires dedicated software and is currently not widely used in clinical practice (Bankier et al., 2017; Callister et al., 2015). Nodule growth is defined as an increase of >1.5mm (>2mm^3) by the Lung-RADS criteria, a change of at least 2mm in average diameter by the Fleischner criteria, or an increase of at least 25% in volume by the BTS (Callister et al., 2015; Christensen et al., 2024; MacMahon et al., 2017). A number of studies have established the advantage of post-processing 3D CT techniques, such as maximum intensity projection (MIP), minimum intensity projection (MinIP), and volume rendering (VR), in the detection and assessment of pulmonary nodules (Li et al., 2019; Naeem et al., 2021).

If an indeterminate nodule is seen on a chest radiograph or CT, prior studies should be reviewed to determine possible growth or stability, including comparison with the earliest available study and more recent studies (Gould et al., 2013; MacMahon et al., 2017; Martin et al., 2023). If stability of a nodule seen on a chest radiograph cannot be determined, CT Chest is appropriate (Gould et al., 2013; Martin et al., 2023). CT is the modality of choice to evaluate pulmonary nodules (Martin et al., 2023). Intravenous contrast is not required to identify or characterize nodules (de Jong et al., 2012; Martin et al., 2023). The size of the nodule is crucial for determining the appropriate timing of follow-up surveillance imaging (MacMahon et al., 2017).

For nodules detected incidentally on incomplete thoracic CT scans, such as cardiac, neck, spine, or abdominal CT, the Fleischner Society recommends no follow-up for most nodules <6mm based on the estimated low risk of malignancy. The ACR states that optional follow-up CT may be performed at 12 months for nodules <6mm with suspicious morphology and/or an upper-lobe location (Martin et al., 2023). For nodules measuring 6-8mm, the Fleischner Society and ACR guidelines recommend CT Chest after the appropriate interval of 3-12 months, depending on clinical risk. For a nodule >8mm or a highly suspicious nodule, immediate CT Chest is recommended (MacMahon et al., 2017; Martin et al., 2023).

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Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)

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Criteria

Solid Pulmonary Nodules

- These time intervals refer to the time from initial detection of the nodule(s).

Incidentally Detected Solid Pulmonary Nodules Follow-up Recommendations*				
Nodule Type	**<6mm (<100 mm ^{3})**	**6–8mm (100-250 mm ^{3})**	**>8mm (>250 mm ^{3})**	**Comments**
Single Nodule	Follow-up (optional) CT at 12 months. No routine follow-up if stable at 12 months	CT at 6–12 months, then CT at 18–24 months if stable *For an 8mm solid nodule PET request, see CH-16.4	CT at 3 months, then CT at 6-12 and then at 18-24 months if stable. Consider PET/ CT** or biopsy	Certain individuals at high-risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-month follow-up
Multiple Nodules	Follow-up (optional) CT at 12 months. *No routine follow-up if stable at 12 months	CT at 3–6 months, then at 18–24 months if stable	CT at 3–6 months, then at 18–24 months if stable. Consider PET/ CT* or biopsy	Use most suspicious nodule as a guide to management. Follow-up intervals may vary according to size and risk.

*These criteria are not intended for use in:

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- individuals aged 35 years or younger, who have a low overall risk of pulmonary malignancy and whose incidentally detected nodules are more likely to be infectious than malignant; management should be individualized
- individuals with a known primary cancer with risks for metastases, for whom imaging would be dictated by the primary oncology guideline section
- immunocompromised individuals at risk for infection, including fungal infections

**PET/CT consider for ≥8mm solid lung nodule or solid component of a sub-solid nodule, not for pure groundglass opacity.

Follow-up indications after PET/CT:

- If a PET/CT was found to be negative, follow-up with CT at 3 months, 9 months, and 21–24 months, if stable.
- If a PET/CT was found to be positive, a biopsy was negative, non-diagnostic, or biopsy not performed, follow-up with CT at 3 months, 9-12 months, and 24 months, if stable

Sub-Solid Pulmonary Nodules

- These time intervals refer to the time from initial detection of the nodule(s).

Incidentally Detected Sub-Solid Pulmonary Nodules Follow-up Recommendations†			
Nodule Type	**<6mm (<100mm ^{3})**	**≥6mm (≥100mm^3)**	**Comments**
Single Ground glass opacity (GGO)	Consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection.	CT at 6–12 months to confirm persistence, then follow-up with CT every 2 years until 5 years**	In certain suspicious nodules, <6mm, consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection.

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Incidentally Detected Sub-Solid Pulmonary Nodules Follow-up Recommendations†			
Single Sub-solid	Consider follow-up at 2 and 4 years. If growth develops, consider resection.	CT at 3–6 months to confirm persistence. If unchanged and solid component remains <6mm, then annual CT should be performed for 5 years.** If the solid component has suspicious morphology (i.e., lobulated margins or cystic components), is >8mm or is growing: Consider PET/CT* or biopsy	In practice, part-solid nodules cannot be defined as such until ≥6mm. Persistent part-solid nodules with solid components ≥6mm should be considered highly suspicious.
Multiple Sub-Solid/Ground Glass	CT at 3–6 months. If stable, consider CT at 2 and 4 years.	CT at 3–6 months. Subsequent management based on the most suspicious nodule(s).	Multiple <6mm pure ground-glass nodules are usually benign.

†These criteria are not intended for use in:

- individuals aged 35 years or younger, who have a low overall risk of pulmonary malignancy and whose incidentally detected nodules are more likely to be infectious than malignant; management should be individualized
- individuals with a known primary cancer with risks for metastases, for whom imaging would be dictated by the primary oncology guideline section
- immunocompromised individuals at risk for infection, including fungal infections

*PET/CT consider for ≥8mm solid lung nodule or solid component of a sub-solid nodule, not for pure groundglass opacity.

**Follow-up after year 5 is considered medically necessary every 2-4 years for at least 10 years if requested.

- Follow-up indications after PET/CT:

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  - If a PET/CT was found to be negative, follow-up with CT at 3 months, 9 months, and 21–24 months, if stable.
  - If a PET/CT was found to be positive, a biopsy was negative, non-diagnostic, or biopsy not performed, follow-up with CT at 3 months, 9-12 months, and 24 months, if stable.
- Sub-solid nodules may either be a part-solid nodule, comprising of both solid and ground glass components or a pure ground glass nodule, the latter may also be referred to as "non-solid".
- For pulmonary nodule follow-up studies a CT Chest without IV contrast (CPT® 71250) is considered medically necessary. IV contrast is considered medically necessary as requested.

Pulmonary Cyst(s)

- May represent a rare form of adenocarcinoma, squamous cell carcinoma, or small cell carcinoma.
- Short-term initial imaging to exclude rapid growth is considered medically necessary at 3-6 months.
- Further imaging can be managed according to the sub-solid pathway above.

Endobronchial Lesion

- CT chest without contrast (CPT® 71250) at 3 months to confirm resolution or persistence
- If persistent, direct visualization with bronchoscopy is considered medically necessary

Evidence Discussion

A pulmonary nodule is defined as a well or poorly defined rounded opacity < 3cm in diameter. The Fleischner Society guidelines for the management of incidental pulmonary nodules detected on CT were last updated in 2017 (MacMahon et al., 2017). The purpose of the guidelines is to minimize both the number of unnecessary follow up exams and the chance of a malignancy advancing in stage during CT follow up prior to diagnosis. Surveillance is most appropriate if there is a very low probability of cancer or a high risk of complications from surgery or biopsy (Gould et al., 2013). It is important to establish the clinical probability of malignancy before ordering imaging (MacMahon et al., 2017; Gould et al., 2013; Callister et al., 2015). The Fleischner guidelines are not intended to apply to people younger than 35, people with known primary cancers at risk of metastases or to immunocompromised people at risk of infection. They do not apply to individuals with unexplained fever or respiratory symptoms (Expert Panel on Thoracic Imaging, 2023). For individuals younger than 35, lung cancer is rare. Management should be on a case by case basis, and the use of serial CT's should be minimized (MacMahon et al., 2017).

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Solid nodules < 6mm do not require follow up in individuals at low risk of lung cancer or in all individuals at high risk. Nodules which have a suspicious morphology or an upper lobe location may be followed up with a CT in 12 months. Solid nodules 6-8mm may be followed with a CT at 6-12 months in low risk individuals with a further follow up at 18-24 months in high risk individuals. Two follow up CT's should be sufficient to rule out growth in most individuals (Expert Panel on Thoracic Imaging, 2023; MacMahon et al., 2017; Gould et al., 2013; Callister et al., 2015).

For solid nodules >8 mm, the options are CT surveillance, an FDG PET/CT, tissue sampling or a combination of these. Surveillance CT scans for solid nodules >8 mm may be done at 3 months, 6-12 months and 18-24 months (MacMahon et al., 2017). The American College of Chest Physicians (ACCP) guidelines recommend a PET/CT or nonsurgical biopsy for solid nodules of at least 8mm when the pretest probability of malignancy is low to moderate.[2] The pretest probability affects the interpretation of PET/ CT results: high risk individuals are at risk of false negative results and low risk individuals are at risk of false positive results (Callister et al., 2015). If there is a high pretest probability of cancer, a negative PET/CT does not reliably rule out cancer and either continued surveillance for at least 2 years or tissue sampling is advised (Gould et al., 2013; Maiga et al., 2018). The ACCP states that the optimal interval for surveillance CT's for solid nodules >8mm is not determined, but standard practice is 3-6 months, 9-12 months and 18-24 months. They suggest surveillance with CT if the clinical probability of cancer is very low, the clinical probability of malignancy is low and a PET CT is negative, a PET CT is negative and a needle biopsy is non-diagnostic, or an informed individual prefers a non-aggressive approach. If a solid nodule shows clear growth on serial CT's, a non-surgical biopsy or surgical resection is recommended unless there are specific contraindications (Gould et al., 2013). A surgical diagnosis is recommended if there is a high clinical probability of lung cancer, the nodule is intensely hypermetabolic on PET/CT, a non-surgical biopsy is suspicious for cancer or an individual prefers a definitive diagnosis (Gould et al., 2013).

Multiple solid nodules <6mm are usually benign, representing granulomas or intrapulmonary lymph nodes. A 12 month follow up CT may be considered in high risk individuals. If there is clinical evidence of infection or the individual is immunocompromised, infection should be considered. A short term follow CT may be appropriate. Multiple solid nodules with at least one nodule greater than or equal to 6 mm can be followed with CT's at 3-6 months and 18-24 months. Management should be based on the largest/most suspicious nodule. Most metastases will grow over 3 months. The risk of cancer increases as the number of nodules increases from 1 to 4 but decreases if the number is greater than 4.

Subsolid nodules (SSN) include pure ground glass nodules (GGN) and part-solid nodules (PSN). SSN are more likely to be malignant than solid nodules but have a better prognosis than lung cancers which present as solid nodules (Callister et al., 2015). Many have slow growth rates and may remain stable for years. Pure GGN < 6mm do

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not require routine follow up. However, this should not preclude the option of follow up CT's at 2 and 4 years in high risk individuals. GGN greater than or equal to 6mm can be followed at 6-12 months and then every two years until 5 years. The Fleischner Society states that these guidelines are not intended to preclude either shorter or longer term follow up in individuals when deemed clinically appropriate. A previous study found growth in 7% of part-solid nodules that had previously been stable for 3 years, and another study found growth >2mm in 13% of nodules after 5 years of stability (Chen et al., 2024). The ACCP states there is controversy regarding how long to follow part solid or ground glass nodules and that follow up over several years may be appropriate. In appropriate individuals, follow-up after 5 years, every 2-4 years, can be considered for at least 10 years, taking into account comorbidities, life expectancy, and individual preferences (Chen et al., 2024).

Solitary PSN < 6mm do not require routine follow up. A follow up CT may be done at 2 and 4 years. For PSN greater than or equal to 6mm with a solid component < 6mm, a follow up CT may be done at 3-6 months and then annually for a minimum of 5 years. The 5 year period is somewhat arbitrary but considered reasonable if the nodule is unequivocally stable during that time period. If the solid component is at least 6mm, follow up at 3-6 months should be done. A persistent PSN with a solid component of at least 6mm or a growing solid component is highly suspicious. If the nodule has suspicious morphology, if the solid component is growing or > 8mm, PET/CT or biopsy should be considered (MacMahon et al., 2017; Callister et al., 2015). Multiple PSN < 6mm are often infectious. A repeat CT can be done at 3-6 months, then at 2 and 4 years. If at least one of the nodules is greater than or equal to 6mm, a repeat CT can be done at 3-6 months, and management should be based on the most suspicious nodule.

The volume of lung nodules is significantly larger in CT chest with contrast compared to CT chest without contrast. Whichever CT protocol is used initially should also be used in all follow-up scans to avoid the risk of missing any relevant nodule growth (de Jong et al., 2012; Rampinelli et al., 2010).

Pulmonary cystic lesions may represent a cyst-related primary lung malignancy. There are no uniform surveillance criteria for these lesions, but some authors recommend a CT at 3-6 months to exclude rapid growth and then follow up CT's according to the SSN nodule guidelines (Mets et al., 2018).

NCCN guidelines for the management of incidental pulmonary nodules are consistent with the Fleischner guidelines (NCCN, 2024; NCCN, 2025). For pulmonary nodules detected on lung cancer screening CT's, adherence to the American College of Radiology (ACR) Lung-RADS guidelines is recommended (MacMahon et al., 2017; Expert Panel on Thoracic Imaging, 2023; NCCN, 2024; NCCN, 2025; Christensen et al., 2024). The British Thoracic Society and ACCP guidelines do not distinguish the management of screening-detected nodules from nodules detected incidentally (Gould et al., 2013; Callister et al., 2015).

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Interval Imaging Outcomes (CH-16.3)

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Criteria

- Further advanced imaging is not medically necessary if a nodule has been:
  - Stable for 2 years
    - Nodules(s) stable on chest x-ray
    - Nodule(s) ≥6mm stable on CT Chest
  - Stable for 1 year
    - Nodule(s) <6mm
  - At any time, if:
    - classically benign characteristics by chest x-ray or previous CT (e.g., benign calcification pattern typical for a granuloma or hamartoma)
    - decreasing in size, (≥ 6mm at start, should be followed for a 2 year period as outlined in CH-16.2) disappearing nodule(s)
- For clinically significant lung nodule(s) (lung nodules not meeting the above criteria) which increase in size or number, serial CT screening or surveillance are not medically necessary.
  - In individuals who do not meet PET criteria (per CH-16.4) or in individuals in which biopsy is not being considered, serial CT may be performed per CH-16.2.

Evidence Discussion

If a chest x-ray (CR) or chest CT has demonstrated that a pulmonary nodule has benign characteristics, further imaging is not medically necessary (Expert Panel on Thoracic Imaging et al., 2023; MacMahon et al., 2017). Benign characteristics include intranodular fat or a diffuse, central, laminated or popcorn pattern of calcification (Expert Panel on Thoracic Imaging et al., 2023; Munden et al., 2021).

If an indeterminate nodule is seen on a CR or CT, prior studies should be reviewed to determine possible growth or stability, including comparison with the earliest available study and more recent ones (Expert Panel on Thoracic Imaging et al., 2023; Gould et al., 2013). If stability of a nodule seen on CR cannot be determined, CT chest is appropriate (Expert Panel on Thoracic Imaging et al., 2023). If a solid nodule has been stable for at least 2 years, no additional evaluation is necessary (Gould et al., 2013; MacMahon et al., 2017). Two years of radiographic stability is considered strong presumptive evidence of a benign nodule (Gould et al., 2013; Truong et al., 2014). For solid nodules seen on CT, further follow up is not needed if nodules < 6mm have been stable for one year or if nodules greater than or equal to 6mm have been

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stable for two years (Expert Panel on Thoracic Imaging et al., 2023; MacMahon et al., 2017). Malignant nodules show a wide range of growth rates with some demonstrating regression at times (Gould et al., 2013; Mazzone & Lam, 2022). Solid nodules greater than or equal to 6mm that decrease in size but do not completely resolve should be followed to resolution or lack of growth over 2 years (MacMahon et al., 2017; Expert Panel on Thoracic Imaging et al., 2023). For situations where PET, CT, and/or biopsy are not reasonable choices, ongoing surveillance would be medically necessary (Expert Panel on Thoracic Imaging et al., 2023). Clinically significant nodules that are not amendable to PET and/or biopsy may undergo serial CT exams per CH-16.2 (Expert Panel on Thoracic Imaging et al., 2023).

There is controversy regarding how long to follow part solid or ground glass nodules (Chen et al., 2024; MacMahon et al., 2017). Follow up over several years may be appropriate (Chen et al., 2024; MacMahon et al., 2017). The Fleischner guidelines state that subsolid nodules <6mm may be followed for up to 4 years but that the guidelines are not intended to preclude either shorter or longer term follow up in individuals when deemed clinically appropriate (MacMahon et al., 2017). Subsolid nodules greater than or equal to 6mm may be followed for 5 years (MacMahon et al., 2017; Chen et al., 2024). The 5 year period is "somewhat arbitrary but considered reasonable if the nodule is unequivocally stable during that time period" (MacMahon et al., 2017).

PET/CT should be considered for solid nodules greater than or equal to 8mm (Maiga et al., 2018; Mazzone & Lam, 2022). If a solid nodule shows clear growth on serial CT's, a non-surgical biopsy or surgical resection is recommended unless there are specific contraindications (Gould et al., 2013; NCCN, 2025). Non-solid nodules which grow or develop solid components are often malignant and further evaluation and/or resection should be considered (Chen et al., 2024; MacMahon et al., 2017).

If a CT demonstrates multiple solid nodules <6mm and there is clinical evidence of infection or the individual is immunocompromised, infection should be considered and a short term follow up CT may be appropriate (MacMahon et al., 2017; Munden et al., 2021). Certain findings on a lung cancer screening CT which suggest an infectious or inflammatory process (e.g., >6 new nodules or solid nodules which are greater than or equal to 8mm appearing in a short interval) are reported as Lung-RADS 0 and may be followed up with a LDCT in 1-3 months (American College of Radiology, n.d.; Christensen et al., 2024). Some findings indicative of an infectious/inflammatory process may not warrant short-term follow-up (e.g., tree-in-bud nodules or new <3 cm ground glass nodules) (Christensen et al., 2024; American College of Radiology, 2022).

Background and Supporting Information:

- Approximately 20% of observed cancers have decreased in size at least at some point during their observation period. Therefore, a decreasing size of a nodule cannot be a reliable indicator of being benign.

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- For nodules that increase in number, this is not meant for known stable or benign nodules to be counted.
  - Example, known 4mm nodule stable for 3 years, now presents with a new solid 8mm pulmonary nodule, follow-up will be driven by new nodule size and type.
  - Example #2, known granuloma 5mm from prior CT Chest one year ago and now CT Chest reveals a new 6 mm sub-solid nodule, follow-up would be driven by the new nodule size and type.

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PET (CH-16.4)

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Criteria

- PET/CT (CPT® 78815) for a solid lung nodule ≥8mm on dedicated advanced chest imaging, as described in **Solitary Pulmonary Nodule – Imaging (CH-16.1).** See **Non-Small Cell Lung Cancer – Suspected/Diagnosis (ONC-8.2)** in the Oncology Imaging Guidelines for lung mass ≥3.1cm.
  - If there is a history of malignancy, refer to the appropriate Oncology restaging/ recurrence guideline for indications for PET imaging.
  - Pleural nodule, See **Pleural-Based Nodules and Other Abnormalities (CH-17.1)**
  - Serial PET studies are considered not medically necessary
  - Not considered medically necessary for infiltrate, ground glass opacity, or hilar enlargement
  - Mediastinal lymphadenopathy - See **Mediastinal Lymphadenopathy (CH-2.3)** or Sarcoid concerns – See **Sarcoid (CH-15.1)**
- If a CT finding led to ordering a PET scan, and if that CT was >3 months ago, a repeat CT (CPT® 71250) or (CPT® 72160) is considered medically necessary prior to considering a PET scan.
  - A change in the status of the original finding may find that a PET scan is considered no longer medically necessary.

Evidence Discussion

PET/CT may be performed for evaluation of a solid lung nodule greater than or equal to 8mm on chest CT (MacMahon et al., 2017; Gould et al., 2013; NCCN, 2024; NCCN, 2025). PET/CT has good sensitivity and moderate specificity for detecting malignancy in individuals with a high risk of cancer and a nodule greater than or equal to 10mm (Mankidy et al., 2023). Consensus opinion is that that nodules <8 to 10mm are not reliably characterized by PET/CT. The false negative rate of PET/CT is higher for nodules <8mm and for malignancies with low metabolic activity, such as adenocarcinoma in situ or well differentiated carcinoid tumor. PET/CT has a lower sensitivity and higher false negative rate for ground glass or part solid nodules (Gould et al., 2013; Mankidy et al., 2023). Infections and inflammatory disorders may cause false positive results.

Repeating a PET/CT is discouraged. If there is a high pretest probability of cancer, a negative PET/CT does not reliably rule out cancer and either continued surveillance for at least 2 years or tissue sampling is advised (Gould et al., 2013; Maiga et al., 2018). If a solid nodule shows clear growth on serial CT's, a non-surgical biopsy or surgical

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resection is recommended unless there are specific contraindications (Gould et al., 2013). A surgical diagnosis is recommended if the nodule is hypermetabolic on PET/CT (Gould et al., 2013).

PET/CT may be indicated for the pre-treatment staging of individuals with confirmed or strongly suspected lung cancer, as detailed in the oncology guidelines (Gould et al., 2013; NCCN, 2024; NCCN, 2025).

Background and Supporting Information

- A **nodule** is any pulmonary or pleural lesion that is a discrete, spherical opacity 2-30mm in diameter surrounded by normal lung tissue. A larger nodule is called a mass. Entities that are not nodules, and are considered benign, include non-spherical linear, sheet-like, two-dimensional or scarring opacities (MacMahon et al., 2017; Munden et al., 2021).
- **Malignant** nodule features can include spiculation, abnormal calcification, size greater than 7-10mm, interval growth, history of a cancer that tends to metastasize to the lung or mediastinum, and/or smoking history (Baum et al., 2024; Mazzone & Lam, 2022; Woodworth et al., 2024).
  - A nodule that grows at a rate consistent with cancer (doubling time 100 to 400 days) may be sampled for biopsy or resected (Gould et al., 2013; Truong et al., 2014).
  - Less than 1% of <6mm lung nodules are malignant (MacMahon et al., 2017).
  - Three percent of all 8mm lung nodules are malignant (Gould et al., 2013; Mazzone & Lam, 2022).
  - Only one follow-up at 6-12 months is sufficient for 6-8mm nodules and not all require traditional 2 year follow-up (MacMahon et al., 2017) .
  - The larger the solid component of a subsolid nodule, the greater the risk of invasiveness and metastases (Chen et al., 2024; MacMahon et al., 2017).
  - Increased risk of primary cancer as the total nodule count increased from 1 to 4 but decreased risk in individuals with 5 or more nodules, most of which likely resulted from prior granulomatous infection (MacMahon et al., 2017).
  - A nodule that does not grow in 6 months has a risk of malignancy at <10% (Mankidy et al., 2023; Mazzone & Lam, 2022)..
- **Benign** features in solid nodules can include benign calcification (80% granuloma, 10% hamartoma), multiple areas of calcification, small size, multiple nodules, negative PET, and stability of size over 2 years (Chen et al., 2024; MacMahon et al., 2017).
- **Ground glass** or subsolid opacities, which can harbor indolent adenocarcinoma with average doubling times of 3–5 years (Gould et al., 2013; Mankidy et al., 2023).
- **Repeat PET** is discouraged. If the original PET is positive, biopsy may be performed. If the original PET is negative but subsequent CT Chest shows an increase in nodule size, biopsy may be performed (Christensen et al., 2024; Maiga et al., 2018).

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- **Positive PET** is defined as a standardized uptake value (SUV) in the lung nodule greater than the baseline mediastinal blood pool. A positive PET can occur with infection or inflammation, including absence of lung cancer with localized infection, presence of lung cancer with associated (post-obstructive) infection and/or related inflammation (Gould et al., 2013; Maiga et al., 2018).
- **False negative PET** can be seen in individuals with adenocarcinoma in situ (formally known as bronchoalveolar carcinoma), carcinoid tumors, a small size nodule, non-solid or ground glass opacity. High pre-test likelihood of malignancy with negative findings on PET only reduces the likelihood of malignancy to 14%; while in an individual with a low pre-test likelihood (20%) of malignancy, a negative PET reduces the likelihood of malignancy to 1% (Gould et al., 2013).

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Pleural-Based Nodules and Other Abnormalities (CH-17)

Guideline

Pleural-Based Nodules and Other Abnormalities (CH-17.1)
Reference (CH-17)

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Pleural-Based Nodules and Other Abnormalities (CH-17.1)

CH.PB.0017.1.A
v1.0.2027

Criteria

- CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) (with contrast is preferred for initial evaluation) is considered medically necessary for pleural nodule(s).
  - Pleural nodule(s) seen on an imaging study other than a "dedicated" CT or MRI Chest.
  - Pleural nodule(s) identified incidentally on any of the following dedicated chest studies can replace CT Chest as the initial dedicated study.
    - CT Chest without and with contrast (CPT® 71270).
    - CTA Chest (CPT® 71275).
    - Low-dose computed tomography (LDCT) (CPT® 71271)
    - MRI Chest without contrast (CPT® 71550).
    - MRI Chest without and with contrast (CPT® 71552).
    - MRA Chest without and with contrast (CPT® 71555).
  - After preliminary comparison with any available previous chest films to determine presence and stability
  - Using largest measurement of multiple nodule(s). (See **Solitary Pulmonary Nodule – Imaging (CH-16.1)**)
  - Following the Fleischner Society Guidelines for high-risk. (See **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)**)
- PET/CT (CPT® 78815) is considered medically necessary if dedicated CT or MRI Chest identifies a pleural nodule/mass or defined area of pleural thickening that is ≥8 mm when there is a likelihood of malignancy including current or previous malignancy, pleural effusion, bone erosion, chest pain.
- For diagnosis or suspicion of pulmonary sequestration:
  - CT chest with contrast (CPT® 71260) OR CTA Chest (CPT® 71275)
  - 3D reconstruction as requested (CPT® 76377) or (CPT® 76376)

Evidence Discussion

- CT Chest is considered medically necessary for the evaluation of pleural nodules (Hallifax et al., 2017; Rivera et al., 2013; Zhu et al., 2020). CT scan is widely available and allows for easy access to isotropic 3-D reformatting (Hallifax et al., 2017). A study

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looking at the utility of CT in investigation for malignancy showed a sensitivity of 68%, a specificity of 78%, a positive predictive value of 80% and a negative predictive value of 65% when CT findings were reported as malignant. CT also carries the risk of exposure to iodinated contrast and ionizing radiation (Hallifax et al., 2017).

- Follow up for previously detected pleural nodules follows guidelines addressed elsewhere in these guidelines (See **Solitary Pulmonary Nodule – Imaging (CH-16.1)** and **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)** (Rivera et al., 2013).
  - Of note, a study looking at over 8,700 LDCT chest scans identified 943 noncalcified nodules attached to the costal pleura, of these 897 were < 10mm in size. There were 603 that were either lentiform, oval, semicircular or triangular in shape and had smooth margins. All of these nodules, that met these qualifications of shape, size and smooth margins, were benign. Follow-up with annual screening, rather than more immediate work-up, was recommended (Zhu et al., 2020).
- Pleural nodule/mass or thickening without suggestion of malignancy would undergo surveillance or biopsy (Hallifax et al., 2017; Lee & Walker, 2023).
- PET/CT may be considered when the identified pleural nodule/mass or thickening is ≥ 8mm and there is a likelihood of malignancy (Rivera et al., 2013). PET/CT may be useful in differentiating between benign and malignant disease; however, studies have shown a broad range of sensitivities (88-100%) and specifies (35-100%). PET/CT may be complicated by false positives such as infections and prior pleurodesis with talc, or false negatives such as low grade/low metabolic activity epithelioid mesothelioma (Hallifax et al., 2017).

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Pleural Effusion (CH-18)

Guideline

Pleural Effusion (CH-18.1)
References (CH-18)

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Pleural Effusion (CH-18.1)

CH.EF.0018.1.A
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Criteria

- CT Chest with contrast (CPT® 71260) is considered medically necessary after:
- Chest x-ray, (upright posterior/anterior/lateral best), (lateral decubitus films can improve sensitivity); **and**

  one of the following:

  - Thoracentesis, (if possible) to determine if fluid is exudative or transudative and remove as much as possible (this fluid can obscure the underlying lung parenchyma and possibly a mass)
  - Concern for loculated effusion, empyema, paramediastinal location, subpleural lung abscess or cavitation
  - Check position of chest tube(s) or drainage catheters
  - Surgical planning
- Chest ultrasound (CPT® 76604) can be used as an alternative or adjunct to chest x-ray to evaluate for the presence of fluid within the pleural spaces and guide thoracentesis.

Evidence Discussion

The most common initial diagnostic test suggesting a pleural effusion is often chest radiography (CR). CR remains the most accessible form of chest imaging and will often be the initial study for suspected pleural disease (Shen-Wagner et al., 2023; Sundaralingam et al., 2020). Lateral decubitus CR has higher sensitivity and specificity for pleural effusion than other positions (Zaki et al., 2024). However, complicated effusions are often loculated and may not layer dependently. Lower lobe consolidation may mask the presence of an effusion. The American Association for Thoracic Surgery (AATS) states that CR, although useful as a first step, should be combined with additional imaging if pleural space infection is suspected (Shen-Wagner et al., 2023; Shen et al., 2017).' The American College of Radiology (ACR) states that consensus recommendations endorse CR as the initial imaging modality for suspected parapneumonic or malignant effusion, but there are limited empiric data to support this (Expert Panel on Thoracic Imaging et al., 2024).

Ultrasound (US) is at least as effective as lateral decubitus views for the detection of pleural fluid and provides a better estimation of fluid volume (Shen et al., 2017; Sundaralingam et al., 2020; Zaki et al., 2024). When standard CR cannot rule out a pleural effusion, US has largely replaced decubitus views due to its speed, portability

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and greater sensitivity. Identification of a pleural effusion for possible US-guided thoracentesis is the primary reason for chest US. The AATS guidelines state that CR and US are class 1 recommendations (should be done) for suspected pleural space infection (Shen et al., 2017). US is more sensitive than CR for detecting pleural effusion (Orlandi et al., 2024; Shao et al., 2022).

PA chest x-ray can show a pleural effusion with approximately 200 ml of pleural fluid while a lateral view can reduce this to 50 ml. Ultrasound is even more sensitive with as little as 3-5 ml of fluid being detected. Thoracentesis can only be safely performed with adequate fluid present. If only a trace effusion or inadequate amount of fluid is seen, a thoracentesis may not be possible (Shao et al., 2022; Sundaralingam et al., 2020; Roberts et al., 2023).

Although diagnostic imaging plays an important role in the evaluation of pleural effusions, thoracentesis with pleural fluid analysis remains the necessary first invasive step. Pleural fluid analysis is considered mandatory unless the clinical presentation suggests a high pretest probability of a transudative effusion (Sundaralingam et al., 2020). Initial evaluation should include an ultrasound (US)-guided thoracentesis to categorize the effusion as a transudate or exudate and obtain specimens for microbiology and cytology (Beaudoin & Gonzalez, 2018; Roberts et al., 2023). If a parapneumonic effusion is suspected, diagnostic aspiration must be performed to identify individuals with a complicated effusion that requires drainage (Beaudoin & Gonzalez, 2018; Shen et al., 2017).

Analysis of fluid may include: cytology, culture, cell count, and biochemical studies. Bilateral effusions are more often systemic related transudates (congestive heart failure, renal failure, liver insufficiency, etc.), and advanced imaging is rarely needed. Large unilateral effusions can be malignant (Beaudoin & Gonzalez, 2018; Shen-Wagner et al., 2023).

CT is not used routinely as the initial imaging study for pleural effusion unless there is suspicion for loculated fluid in an interlobar fissure or paramediastinal location, or CR demonstrates parenchymal lesions suggestive of cancer, septic emboli or cavitation. CT can better distinguish between a loculated empyema and subpleural lung abscess. CT with IV contrast optimizes imaging of the pleura. CT chest with contrast is a class 2a recommendation (reasonable) for suspected pleural space infection in the AATS guidelines (Tsakok & Hallifax, 2021; Yamada et al., 2024). If the etiology of an exudative effusion cannot be identified, or if it is not safe to perform a thoracentesis, a CT chest with contrast is considered medically necessary (Beaudoin & Gonzalez, 2018; Roberts et al., 2023).' The American College of Radiology (ACR) states that CR or CT chest with IV contrast is considered medically necessary as initial imaging for people with recent pneumonia and suspected parapneumonic effusion or for people with dyspnea, cough or chest pain with a suspected malignant pleural effusion (Expert Panel on Thoracic Imaging et al., 2024). Thoracentesis and chest CT cannot rule out malignancy or

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tuberculosis. Pleural biopsy is indicated for a recurrent undiagnosed exudative effusion (Beaudoin & Gonzalez, 2018; Roberts et al., 2023; Sundaralingam et al., 2020).' When a diagnosis cannot be made, monitoring with interval CT scans for up to 2 years is considered medically necessary (Roberts et al., 2023). CT is used in the diagnosis and management of late-stage empyema and malignant pleural effusion and can be used to check the position of drains and plan for surgical intervention (Sundaralingam et al., 2020). CT scans have high specificity but low sensitivity in distinguishing benign from malignant pleural effusion (Orlandi et al., 2024).

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Pneumothorax/ Hemothorax (CH-19)

Guideline

Pneumothorax/Hemothorax (CH-19.1)
Pneumomediastinum: Subcutaneous Emphysema (CH-19.2)
References (CH-19)

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Pneumothorax/Hemothorax (CH-19.1)

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Criteria

Chest x-ray and CT Chest are the first line tests for detecting pneumothorax/hemothorax and ruling out other lung diseases.

- Chest x-ray is considered medically necessary initially.
  - CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) if:
    - diagnosis of a small pneumothorax is in doubt, and the presence of a pneumothorax will affect individual treatment decisions
    - preoperative study for treatment of pneumothorax
    - pneumothorax associated with hemothorax
    - suspected complications from hemothorax (e.g., empyema)
    - suspected Alpha-1-Antitrypsin Deficiency (even without pneumothorax)
    - suspected cystic lung disease, including lymphangioleiomyomatosis (LAM), tuberous sclerosis (TS), or Birt-Hogg-Dube (BHD) syndrome
    - to determine the etiology of persistent pneumothorax/air leak, such as chest tube malposition, bronchopleural fistula, loculated pneumothorax, lung parenchymal disease
    - suspected catamenial pneumothorax/thoracic endometriosis
- MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) for:
  - detecting diaphragmatic endometriosis
  - pre-surgical planning for thoracic endometriosis

Evidence Discussion

The majority of pneumothorax cases can be confirmed by upright PA chest radiography (CR), which remains the standard initial exam (Tschopp et al., 2015). While US has a high sensitivity/specificity for pneumothorax, it is operator-dependent and is considered not medically necessary as a primary imaging modality (Choi et al., 2021; Ron et al., 2022; Sheng et al., 2025; Tran et al., 2021).

While CT is more sensitive than CR in detecting pneumothorax, it is generally considered not medically necessary for diagnosis and should be avoided due to excess radiation (Tschopp et al., 2015). CT may be considered medically necessary for diagnosing a very small pneumothorax or differentiating between a pneumothorax and a giant bulla in bullous emphysema. Although CT is the best method to measure the size

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of a pneumothorax, current evidence does not support basing treatment decisions solely on size (Mendogni et al., 2020).

The 2001 ACCP guidelines advise against routine CT use for a first-time primary spontaneous pneumothorax (PSP). However, CT may be considered medically necessary to evaluate suspected pulmonary disorders not apparent on CR. For secondary spontaneous pneumothorax (SSP), CT is acceptable for managing recurrent pneumothorax, persistent air leak, and surgical planning.

In contrast, the 2023 British Thoracic Society recommends CT chest for individuals with symptoms and high-risk characteristics (Roberts et al., 2023). These include hemodynamic compromise, significant hypoxia, bilateral pneumothorax, underlying lung disease, hemopneumothorax, or age over 49 with a significant smoking history. This recommendation applies if the pneumothorax size on CR is insufficient for safe needle aspiration or chest tube intervention. The European Respiratory Society suggests that CT may be useful in complicated cases, when chest tube misalignment is suspected, when underlying lung disease is suspected, and in individuals requiring surgery (Tschopp et al., 2015).

High-resolution CT (HRCT) has better sensitivity than routine CT in the pre-operative detection of blebs and bullae (Mendogni et al., 2020). However, it is unclear whether HRCT can predict the risk of recurrence or identify which individuals may benefit from surgical intervention. It may help to identify those at lower risk: the positive predictive value of CT bleb scores for ipsilateral recurrence is relatively low at 68%, while the negative predictive value is high at 94% (Barton et al., 2023).

Some experts advise considering a CT scan after a first time PSP if there are factors such as a family history of pneumothorax, presence of blebs, cysts, or bullae; female sex; or a family or personal history and/or physical examination findings suggestive of a pneumothorax-associated syndrome (Boone et al., 2019).

Although they have low specificity, the most sensitive tests for detecting pneumothorax and hemothorax are CR and CT. For detecting diaphragmatic endometriosis, Magnetic Resonance Imaging (MRI) of the chest is preferable (Nezhat et al., 2019).

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Pneumomediastinum: Subcutaneous Emphysema (CH-19.2)

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Criteria

- Chest x-ray is initially considered medically necessary.
  - CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) if:
    - recent vomiting and/or suspected esophageal perforation
    - associated pneumopericardium
    - associated pneumothorax
    - preoperative study for treatment

Evidence Discussion

The diagnosis of Pneumomediastinum (PM) is usually established by a clinical exam and CR. The CR should include a lateral view (Dirweesh et al., 2017). CR is the most common diagnostic imaging study (Alemu et al., 2021; Magouliotis et al., 2023; Morgan et al., 2021). The reported sensitivity of CR ranges from 60-90%. CT is more sensitive than CR, especially in cases of small amounts of air in the mediastinum (Dirweesh et al., 2017).

There is no evidence defining when CT should be used to evaluate pneumomediastinum (PM). CT should be done if the suspicion for PM remains high despite a normal CR or if there is concern for secondary PM due to a specific pathologic event (Magouliotis et al., 2023).

CT can be beneficial in detecting injury to the tracheobronchial system, pneumothorax, pneumopericardium or esophageal perforation (Susai et al., 2023). Despite the usually benign and self-limiting course of spontaneous PM, additional imaging is often undertaken to rule out esophageal perforation or other underlying disorder. A retrospective review of adolescents and young adults with spontaneous PM demonstrated that no clear criteria were used for obtaining a CT and that the CT's did not impact clinical decisions (Wald et al., 2024). The authors concluded that advanced imaging is over-utilized in individuals with suspected spontaneous PM without clinical evidence of necessity.

Inspiratory/expiratory chest x-rays are helpful in defining whether a pneumothorax is present, and an expiration chest x-ray can enhance the evaluation of an equivocal plain x-ray (Roberts et al., 2023; Tschopp et al., 2015). There is no data supporting the use of serial CT Chest to follow individuals with a known pneumothorax, pneumomediastinum,

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or hemothorax who are asymptomatic or have stable symptoms (Roberts et al., 2023; Susai et al., 2023; Tschopp et al., 2015; Wald et al., 2024).

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Mediastinal Mass (CH-20)

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Mediastinal Mass (CH-20.1)
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Mediastinal Mass (CH-20.1)

CH.MM.0020.1.A
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Criteria

- CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) or MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) is considered medically necessary to evaluate mediastinal abnormalities (e.g., mediastinal cyst, including bronchogenic, thymic, pericardial, or esophageal) seen on chest x-ray or other non-dedicated chest imaging.
- MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) is considered medically necessary for indeterminate mediastinal mass on CT Chest.
  - Surveillance imaging is considered medically necessary no more frequently than 3-month intervals over 2 or more years when the lesion(s) remain indeterminate on MRI and a biopsy has not been performed.
- FDG PET/CT offers limited additional value beyond that of conventional CT in the initial assessment of mediastinal mass(es), with the exception of primary mediastinal lymphoma. See **Non-Hodgkin Lymphomas (ONC-27)** or **Hodgkin Lymphoma (ONC-28)** in the Oncology Imaging Guidelines. A positive FDG PET/CT has little value for discrimination between benign and malignant lesions. A negative FDG PET/CT does not prevent serial CT/MRIs, due to appreciable false negative rate.
  - MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) is considered medically necessary for indeterminate mediastinal mass on FDG PET/CT.
- CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) or MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) is considered medically necessary for subsequent evaluations if:
  - new signs or symptoms, or
  - preoperative assessment
- For Adenopathy; See **Lymphadenopathy (CH-2).**
- For Goiter; See **Thyroid Nodule (NECK-8.1)** in the Neck Imaging Guidelines.
- For Myasthenia Gravis; See **Neuromuscular Junction Disorders (PN-6.1)** in the Peripheral Nerve Disorders Imaging Guidelines.
- For fibrosing mediastinitis: See **Fungal Infections (Suspected or Known) (CH-14.2)**

Evidence Discussion

Mediastinal nodules or masses may present as incidental findings on chest radiographs and cross-sectional imaging. Alternatively, they may be found during the evaluation

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of symptoms and signs that include chest pain, cough, dyspnea, dysphagia, cardiac tamponade, diaphragmatic paralysis, central venous thrombosis, superior vena cava syndrome, B-symptoms (in lymphoma), myasthenia gravis, and other paraneoplastic syndromes. The incidence rate is low with a reported prevalence of 0.73-4%. The most frequent lesions encountered in the mediastinum are thymoma, neurogenic tumours and benign cysts (Ackman et al., 2021; Jain et al., 2025).

CT is superior to chest radiography for detection of invasion of the mass across tissue planes, secondary to its higher contrast resolution. Anterior mediastinal tumors account for 50% of all mediastinal masses. CT has the ability to show the precise location, morphology, and pattern of contrast enhancement of an anterior mediastinal mass as well as its relationship to other mediastinal components or borders (Ackman et al., 2021; Jain et al., 2025).

MRI remains superior to CT for detection of invasion of the mass across tissue planes, including the chest wall and diaphragm, and involvement of neurovascular structures secondary to its higher soft-tissue contrast. MRI allows further tissue characterization of mediastinal masses beyond that of CT and FDG-PET/CT. Chemical-shift MRI has been shown to be useful in distinguishing normal thymus and thymic hyperplasia from thymic neoplasms and lymphoma. It can also prove the cystic nature of an indeterminate, non–water attenuation thymic mass on CT, preventing unnecessary biopsy and thymectomy. The frequency of surveillance imaging for indeterminate lesions seen on MRI is usually 3-12 month intervals over 2 years or more, depending upon level of clinical concern (Ackman et al., 2021; Kim et al., 2023; Jain et al., 2025). The diagnostic accuracy of chest MRI for the detection of mediastinal mass is 71-91% (Kim et al., 2023).

(FDG)-PET/CT offers limited additional value beyond that of conventional CT in the initial assessment of mediastinal masses, with the exception of its use for primary mediastinal lymphoma staging and surveillance and detection of metastatic lymphadenopathy. A positive FDG-PET/CT has little value for discrimination between benign and malignant lesions (Ackman et al., 2021; Proli et al., 2018; Reddy, 2022; Jain et al., 2025).

It is reasonable to perform a chest radiograph as an initial imaging step. Chest radiography can help localize a mass to a specific mediastinal compartment and thereby narrow the differential diagnosis. Chest radiography offers limited assistance regarding tissue characterization of mediastinal masses, with the exception of its occasional demonstration of calcium within a lesion (Ackman et al., 2021).

There is little relevant literature to support the use of ultrasound (US) in the initial evaluation of a clinically suspected mediastinal mass (Ackman et al., 2021).

Fibrosing mediastinitis (FM) is a rare benign but potentially life threatening process characterized by progressive proliferation of dense infiltrative fibrous tissue in the mediastinum and/or hila. Granulomatous FM is the more common subtype in the US

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and is typically associated with prior infection with histoplasmosis. Nongranulomatous FM is less common and is usually associated with an autoimmune disorder, drug exposure, or prior radiation. The most common symptoms are cough, dyspnea, hemoptysis, and pleuritic chest pain. Individuals may develop SVC syndrome or post-obstructive pneumonia. Widening of the mediastinum and mediastinal/hilar lymphadenopathy are the most common abnormal findings on chest x-ray. CT chest with contrast is the modality of choice for suspected FM. MRI is equivalent to CT for evaluating extent of disease, but CT is superior for evaluation of airways and calcification. PET CT is nonspecific and not routinely used. Nonsurgical and surgical procedures for individuals with clinical symptoms are related to compression or obstruction of mediastinal structures. CTA chest may be used for procedural planning or to evaluate the patency of vascular stents. There are no consensus guidelines for follow up imaging. No routine imaging is considered medically necessary for the granulomatous subtype unless there are progressive symptoms or clinical decompensation. Regular surveillance with CT is recommended for the nongranulomatous subtype to rule out malignancy which may not have been sampled in a biopsy (Garrana et al., 2019; Ramachandran et al., 2025).

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Chest Trauma (CH-21)

Guideline

Chest Trauma (CH-21.1)
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Chest Trauma (CH-21.1)

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Criteria

- Chest x-ray is medically necessary initially.
  - CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is considered medically necessary for the following situations:
    - Rib or sternal Fracture when clinical findings or other imaging identifies associated complications including pneumothorax, hemothorax, pulmonary contusion, atelectasis, flail chest, cardiovascular injury and/or injuries to solid or hollow abdominal organs.
    - Rib or sternal facture when malignancy is suspected as the etiology for uncomplicated, single fractures, multiple fractures, non-acute fractures, or occult rib fractures that are identified on x-ray.
    - Routine follow-up advanced imaging of rib or sternal fractures is considered not medically necessary.
- CT Chest without contrast (CPT® 71250) or Tc-99m bone scan whole body (CPT® 78306) is considered medically necessary for suspected pathological rib fractures, with or without a history of trauma
- For clavicle fractures and sterno-clavicular (SC) dislocation, see **Joint Instability and Dysfunction (MS-30.0)**.
- Advanced imaging of the abdomen or pelvis is considered not medically necessary for chest trauma when there is no physical examination or laboratory evidence of abdominal and/or pelvic injury.

Evidence Discussion

- Chest x-ray, in combination with physical exam, is the appropriate initial diagnostic modality in those with suspected rib or sternal fracture after chest trauma. Although chest x-ray has low sensitivity (approximately 50%) for detection of rib fracture (Henry et al., 2019), it has the benefit of being widely and readily available and able to detect complications that may require additional imaging such as pneumo- or hemothorax and pulmonary contusions (Henry et al., 2019; Lewis et al., 2021). In addition, failure to detect rib fractures in uncomplicated cases does not significantly alter the individual management or outcomes. A study by Bansidhar et al. showed no difference in treatment in individual with minor chest trauma who did and did not have rib fractures diagnosed either clinically or radiographically (Henry et al., 2019). Therefore, in uncomplicated cases, additional advanced imaging is considered not medically necessary. Rodriguez et al. demonstrated that yield for CT of thoracic injury

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with major clinical significance after a normal chest x-ray is 1.5% and would only detect one major injury for every 67 studies (Rodriguez et al., 2017).

- In cases where complications are identified clinically or by other imaging, additional imaging with CT chest is considered medically necessary. CT does have higher sensitivity for detection of rib fractures (Henry et al., 2019) and in the detection and extent of pulmonary injuries (Lewis et al., 2021). It also may be useful in differentiating blunt cardiac injury from acute myocardial infarction. However, CT does carry with it the risk of contrast related renal injury and allergic reactions (Rodriguez et al., 2017). It also exposes the individual to a greater amount of ionizing radiation than a chest x-ray and subsequent increased risk of induced cancers (Rodriguez et al., 2017). It is estimated that undergoing chest CT will result in one radiation induced cancer per every 720 40-year-old females and 1,538 40-year-old males (Rodriguez et al., 2017).
- If a pathological rib fracture is suspected, imaging with either a CT chest or Tc-99m bone scan is considered medically necessary. CT may be helpful in differentiating primary tumor from metastasis and may aid in detection of the primary malignancy. Tc-99mm bone scan has low specificity but high sensitivity (>95%) for detection of pathologic rib fractures (Henry et al., 2019).
- Medial clavicular fractures are rare (<5% of cases) and may necessitate additional imaging with CT or MRI for evaluation (Flores et al., 2020). Midshaft and distal clavicular fractures are usually sufficiently evaluated by x-ray (Flores et al., 2020).
- Chest x-ray has poor sensitivity for identification of sternoclavicular dislocations. Given the risk for complications such as pneumothorax in posterior displacement, advanced imaging may be considered medically necessary. CT is advantageous as it has superior image resolution. It also allows for 3D reconstruction to determine exact position of the sternoclavicular joint. MRI can also be utilized but it has poorer resolution than CT. However, it may be advantageous for evaluation of soft tissue conditions or ligamentous injury (Morell & Thyagarajan, 2016).
- For isolated chest injury without signs or symptoms of abdominal or pelvic injury, advanced imaging of the abdomen or pelvis is considered not medically necessary. If abdominal or pelvic injury is suspected, imaging is as dictated elsewhere in these guidelines.

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Chest Wall Mass (CH-22)

Guideline

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Chest Wall Mass (CH-22.1)

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Criteria

- Chest x-ray is useful in the workup of a soft-tissue mass and is considered medically necessary as the initial imaging study.
  - Chest ultrasound (CPT® 76604) is considered medically necessary as an initial imaging study in the setting of a suspected superficial or subcutaneous lipoma. This modality may also be valuable in differentiating cystic from solid lesions and has also been used to assess the vascularity of lesions.
  - Following a non-diagnostic chest x-ray that does not show an obvious lipoma(s) or clearly benign entity (see **Tissue Growths and Masses (MS-10)** in the Musculoskeletal Imaging Guidelines), ONE of the following is considered medically necessary:
    - MRI Chest without and with contrast (CPT® 71552) or
    - MRI Chest without contrast (CPT® 71550) or when MRI is contraindicated,
    - CT Chest with contrast (CPT® 71260) or
    - CT Chest without contrast (CPT® 71250)

Evidence Discussion

Radiography is medically necessary as the initial imaging study for both superficial and non-superficial soft tissue masses. Radiography can help identify calcifications, bone involvement, intrinsic fat, and unsuspected skeletal abnormality or deformity. In general, radiographic findings related to a soft tissue mass can provide helpful insight in determining the next most appropriate imaging modality for further characterization (Garner et al., 2023; Haseli et al., 2022; Mansour et al., 2022). Non-contrast enhanced ultrasound is also an excellent triage tool for evaluating superficial soft tissue masses like superficial lipomas (Garner et al., 2023; Mansour et al., 2022; Safai Zadeh et al., 2023). However, ultrasound is not sufficient to assess for malignancy. When features detected on ultrasound are not clearly benign or when findings are concerning, further advanced imaging is medically necessary (Garner et al., 2023).

MRI without and with IV contrast is medically necessary as the next imaging study for a soft tissue mass following non-diagnostic radiographs (Garner et al., 2023; Ahlawat et al., 2024; Mansour et al., 2022).

MRI helps to define intrinsic tumor characterization, vascular structures, neurovascular involvement, hemorrhage, edema, and tumor necrosis. MRI without IV contrast may be beneficial compared with CT, but the use of MR contrast improves the differentiation

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of benign from malignant soft tissue masses (Garner et al., 2023; Ahlawat et al., 2024; Mansour et al., 2022). At least 20% to 25% of soft tissue masses can demonstrate features that allow for confident diagnosis based on MRI alone, many of which are benign and thus would not warrant biopsy (Garner et al., 2023; Mansour et al., 2022; Haseli et al., 2022). MRI has a sensitivity of 96%, a specificity of 72%, a positive predictive value of 77%, a negative predictive value of 83%, and a diagnostic accuracy of 88% (Kolta et al., 2021).

When MRI is contraindicated, CT with IV contrast is medically necessary following non-diagnostic radiograph.

CT with IV contrast is useful in distinguishing vascularized from potentially necrotic regions of a tumor or calcification (Garner et al., 2023; Haseli et al., 2022; Mansour et al., 2022).

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Pectus Excavatum and Pectus Carinatum (CH-23)

Guideline

Pectus Excavatum and Carinatum (CH-23.1)
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Pectus Excavatum and Carinatum (CH-23.1)

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- CT Chest without contrast (CPT® 71250) or MRI Chest without and with contrast (CPT® 71552) and 3-D reconstruction (CPT® 76377 or CPT® 76376) if:
  - Candidates for surgical correction.
  - Cardiac or pulmonary dysfunction has been identified
    - ECG and echocardiography if cardiac symptoms or evidence of cardiac function abnormalities.
    - Chest x-ray and PFT's if increasing shortness of breath.

Background and Supporting Information

- Chest measurements derived from CT Chest, such as the Haller Index or the correction index, are helpful to the thoracic surgeon in pre-operative assessment of chest wall deformities to assess for the appropriateness of operative repair prior to the development of symptomatic pectus deformities.
- The Haller index is calculated using the width of the chest divided by the distance between the posterior surface of the sternum and the anterior surface of the spine. A Haller index score is normal at 2.5 to 2.7 and severe at 3.25 or greater. The correction index uses an equation of (b−a)/b×100, in which a is the minimum distance between the anterior spine and the posterior surface of the sternum, and b is the maximum distance between the anterior spine and most anterior internal rib. It yields a percentage that the chest would need to be corrected to achieve normal dimensions, with a normal level being 10% or less.
- Some have suggested that a CXR can replace the CT Chest for Haller Index calculation with a strong correlation and high diagnostic accuracy.
- Expert consensus from The Society of Thoracic Surgeons 2023 recommended that a comprehensive evaluation with spirometry, ECG, and echocardiography be done with any cardio-pulmonary complaint. The Haller index, correction index, pulmonary compression or failed previous repair, in and of itself, was not an indication for surgery. Corrective surgery indications for those with severe pectus excavatum included: progression of deformity, presence of cardio-pulmonary symptoms, mitral valve prolapse, arrhythmia, significant body image disturbances, abnormal PFTs, abnormal cardiac function test, or the presence of cardiac compression on imaging (echo or CT).

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Pulmonary Arteriovenous Fistula (AVM) (CH-24)

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Pulmonary AVM (CH-24.1)

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Criteria

- CT Chest with contrast (CPT® 71260), CT Chest without contrast (CPT® 71250), CTA Chest (preferred modality for pre-intervention planning) (CPT® 71275), or MRA Chest (CPT® 71555) for evaluation of:
  - suspected pulmonary AVM, including individuals with HHT (Hereditary Hemorrhagic Telangiectasia) or who have a first degree relative with HHT
  - first degree relatives of an individual with a primary pulmonary AVM
  - evaluation of individuals with paradoxical embolus/stroke and no evidence of patent foramen ovale on echocardiogram
  - follow-up of treated AVM's at 6 months post embolization and then every 3-5 years
  - follow-up of untreated AVM's to be determined by treating physician but no more than annually. Usually the interval is 3-5 years due to the slow-growth nature of PAVM's
  - treated or untreated PAVM's with recurrent symptoms

Evidence Discussion

Chest x-ray is the most appropriate initial imaging exam with presentation of hypoxemia or hemoptysis but it does have low sensitivity for pulmonary arteriovenous malformation (PAVM) (Pillai et al., 2024).

CT chest is the test of choice for diagnosing a PAVM. Contrast may be considered for an atypical nodule/soft tissue lesion on CT chest without contrast and suspicion for a PAVM. CTA chest is the gold standard for defining the vascular anatomy of a previously identified PAVM. It is not routinely used for diagnosis except in the setting of concomitant embolization therapy, diagnostic uncertainty, or pre-intervention planning (Pillai et al., 2024). MRA chest avoids ionizing radiation but is not as sensitive or specific as CT for the diagnosis of PAVM and has limitations detecting PAVM <5mm (Pillai et al., 2024). It has a potential role in younger people with Hereditary Hemorrhagic Telangiectasia (HHT) who may require lifelong surveillance (Pillai et al., 2024).

CT chest without contrast may be done to screen for PAVM in people with possible or confirmed Hereditary Hemorrhagic Telangiectasia (HHT) (Faughnan et al., 2020). A negative CT chest with or without contrast helps to exclude a clinically significant PAVM (Shovlin et al., 2017).

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Background and Supporting Information

- Pulmonary AVMs are abnormal connections between pulmonary arteries and veins, usually found in the lower lobes, that can be either primary (such as in individuals with HHT) or acquired (such as trauma, bronchiectasis). They can be identified in up to 98% of chest x-rays by a peripheral, circumscribed, non-calcified lesion connected by blood vessels to the hilum of the lung. (Lee & Hyun, 2022; Salibe-Filho et al., 2023; Shovlin et al., 2017).

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Pulmonary Embolism (PE) (CH-25)

Guideline

Pulmonary Embolism (CH-25.1)
References (CH-25)

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Pulmonary Embolism (CH-25.1)

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Criteria

- CT Chest with contrast with PE protocol (CPT® 71260) or CTA Chest (CPT® 71275) is considered medically necessary if at least one symptom, clinical/laboratory finding, or risk factor from each of the lists below are present.
  - With any ONE of the 3:
    - Dyspnea, new onset and otherwise unexplained;
    - Chest pain, pleuritic;
    - Tachypnea
  - AND, with any ONE of the 3:
    - Abnormal **D-dimer** test;
    - Wells Criteria score* higher than 4 points;
    - One risk factor** or symptom** of new onset demonstrating high clinical probability of PE

RISK FACTORS**	SYMPTOMS ATTRIBUTED TO PE**
Immobilization via hospitalization or institutional care at least 3 days or surgery in last 4 weeks or recent trauma	Signs or symptoms of DVT
Previous history of DVT or PE	Hemoptysis
Cancer actively treated in last 6 months or receiving palliative treatment or myeloproliferative disorder	Right heart strain or failure
Recent history of a long airplane flight	Systolic BP <90
Use of estrogen-based contraceptives (birth control pills), oral estrogen	Syncope
Advanced age (≥70)	Cough

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RISK FACTORS**	SYMPTOMS ATTRIBUTED TO PE**
Congestive heart failure, congenital heart disease, hypertension, superficial venous thrombosis, and/or indwelling central vein catheter	Heart Rate >100
Obesity (BMI ≥30)	Palpitations
COVID-19 for those post-hospitalization or those within 30 days of diagnosis	
Recurrent pregnancy loss	
COPD	
Thrombotic disorders, antiphospholipid antibody syndrome, and/or autoimmune disease	
Inflammatory bowel disease	
Nephrotic syndrome	
In vitro fertilization (IVF) treatment	

Well's Criteria for Clinical Probability of PE*	
Clinical signs/symptoms of DVT (at minimum: leg swelling and pain with palpation of the deep veins)	3
PE is likely or equally likely diagnosis	3
Heart rate >100	1.5
Immobilization at least 3 days or surgery in last 4 weeks	1.5
Previous history of DVT or PE	1.5
Hemoptysis	1
Cancer actively treated in last 6 months or receiving palliative treatment	1

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Well's Criteria for Clinical Probability of PE*
Calculate Probability: Low <2 Moderate 2 to 6 High >6
Using the above criteria, only 3% of individuals with a low pretest probability had PE versus 63% of those with a high pretest probability.

- Cases which do not meet above 2-step criteria, should undergo prior to advanced imaging:
  - Chest x-ray (to rule out other causes of symptoms)
  - EKG to rule out potential cardiac etiologies
- MRA Chest with IV contrast is considered medically necessary as an alternative to CT Chest with contrast with PE protocol (CPT 71260) or CTA Chest (CPT 71275) when there is a contraindication to iodinated contrast and V/Q scan is nondiagnostic, unavailable, or otherwise not preferred.
- Pregnancy is a risk factor for thrombo-embolic events in and of itself. Additional risk factors are not required. Pregnant individuals with suspected PE should proceed with:
  - If signs/symptoms of DVT are present, Doppler studies of the lower extremities (CPT® 93970 bilateral study or CPT® 93971 unilateral study) are considered medically necessary
  - If no signs/symptoms of DVT, then chest x-ray first.
  - If chest x-ray is normal, then V/Q scan (CPT® 78580 or CPT® 78582) (preferred test), or CTA Chest (CPT® 71275) or CT Chest with contrast with PE protocol (CPT® 71260)
  - If chest x-ray is abnormal or after non-diagnostic V/Q scan or if V/Q scanning is not readily available, then CTA Chest (CPT® 71275) or CT Chest with contrast with PE protocol (CPT® 71260).
- Ventilation-perfusion scans, also called V/Q, scans (CPT® 78580-Pulmonary Perfusion Imaging; CPT® 78582-Pulmonary Ventilation (e.g., Aerosol or Gas) and Perfusion Imaging) or SPECT/CT (CPT® 78830):
  - Is not a replacement for CTA Chest
  - Is considered medically necessary in any of the following:
    - Suspected pulmonary embolism if there is a contraindication to CT or CTA Chest (ventilation-perfusion scans CPT® 78582)
    - Suspected pulmonary embolism when a chest x-ray is negative and CTA Chest is not diagnostic (CPT® 78580 or CPT® 78582)
    - Follow-up of an equivocal or positive ventilation-perfusion lung scan to evaluate for interval change (CPT® 78580)

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    - Suspected Chronic thromboembolic disease or Chronic thromboembolic pulmonary hypertension*, usually after 3 months of effective anticoagulation (CPT® 78580 or CPT® 78582)
- Follow-up imaging in stable or asymptomatic individuals with known PE is considered not medically necessary
- Follow-up imaging with CT Chest with contrast with PE protocol (CPT® 71260) or CTA Chest (CPT® 71275) for ANY of the following indications:
  - Recurrent or persistent signs or symptoms such as dyspnea, or
  - Elevated D-dimer which is persistent or recurrently elevated, or
  - Current evidence for right heart strain or failure identified by EKG, ECHO or heart catheterization
- For Pulmonary Artery Hypertension (PAH), see **Pulmonary Artery Hypertension (PAH) – Indications (CD-8.1)** in the Cardiac Imaging Guidelines.

Evidence Discussion

Symptoms and signs of pulmonary embolus (PE) are nonspecific and common; therefore, knowing whom to test for PE is challenging (Kahn & de Wit, 2022). In North America, PE is diagnosed in only 5% of people tested for it (Konstantinides et al., 2020). Chest x-ray (CR) is nonspecific but may rule out other causes of dyspnea and chest pain. Avoiding the overuse of imaging tests is important, given the potential harms of radiation exposure, high costs and complications. The pretest clinical probability has an important effect on the predictive value of CT pulmonary angiography (CTPA) (Kahn & de Wit, 2022). Determining the clinical pretest probability of PE depends on clinical judgment, which lacks standardization and is subjective, or prediction rules (Ishaaya & Tapson, 2020; Konstantinides et al., 2020). Kahn et al recommend diagnostic imaging in those with a likelihood of PE greater than or equal to 15%, based on the "implicit sense" of the clinician, and either a structured clinical probability score (Wells, Revised or Simplified Geneva score) or a D-dimer above a pre-specified threshold (Kahn & de Wit, 2022). Other experts recommend that imaging be done in those with a high pretest probability based on empirical clinical judgment or a prediction rule and in those with a low/intermediate pretest probability and a positive D-dimer (Kirsch et al., 2022; Konstantinides et al., 2020). Imaging can be avoided in people with both a structured clinical probability score at or below the given cutoff and a D-dimer below the given cutoff value (Kahn & de Wit, 2022). Imaging is considered not medically necessary in those with a low/intermediate pretest probability based on clinical judgement and a normal D-dimer (Kirsch et al., 2022; Konstantinides et al., 2020).

CTPA is highly sensitive and specific and is the imaging method of choice for suspected PE (Ishaaya & Tapson, 2020; Kahn & de Wit, 2022; Kirsch et al., 2022; Konstantinides et al., 2020). It may also demonstrate other potential causes of the presenting symptoms. CTPA is a CT angiogram with intravenous (IV) contrast. The timing of the scan is tailored so that contrast enhances the pulmonary arterial system to identify

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potential filling defects. CT with contrast is usually considered not medically necessary. According to the American College of Radiology, when IV contrast is given during CT acquisition for suspected PE, the study should be performed as a CTPA (Kirsch et al., 2022).

Planar V/Q may preferentially be used in outpatients with a low clinical probability of PE and normal CR, in young (especially female) individuals, pregnant women, and individuals with a history of contrast allergy or renal failure (Konstantinides et al., 2020). The proportion of diagnostic V/Q scans is higher in individuals with a normal CXR. A normal V/Q scan has a high negative predictive value, but there is a high proportion of non-diagnostic scans and it cannot provide alternative diagnoses (Konstantinides et al., 2020). Abnormal regional lung perfusion may suggest PE but is not specific and requires correlation with ventilation studies or other imaging. Investigators have studied single-photon emission CT (SPECT) to improve the sensitivity and specificity of V/Q scans. Kahn et al state that V/Q SPECT is a low radiation option to minimize lung and breast tissue irradiation in younger individuals (Currie & Bailey, 2023). Some authors believe that V/Q SPECT should be the preferred study in the evaluation of suspected PE (Currie & Bailey, 2023). However, large scale prospective trials are needed to validate SPECT techniques before its widespread incorporation into diagnostic algorithms (Konstantinides et al., 2020). SPECT has over 90% sensitivity and 72-98% specificity, and V/Q SPECT/CT has the highest diagnostic accuracy (Bang et al., 2024; Iftikhar et al., 2024; Squizzato et al., 2023).

A normal perfusion scan and a negative CTPA appear equally safe for ruling out PE in pregnancy (Konstantinides et al., 2020). There is debate regarding which is the first test of choice. CTPA is more expensive and exposes the pregnant woman to more radiation than the fetus; V/Q scans have low radiation and no contrast-related side effects (Tester et al., 2020).A compression duplex ultrasound of the lower extremity is considered medically necessary if there are symptoms/signs of a DVT. If a DVT is diagnosed, anticoagulation can be administered without further imaging. A CXR is considered medically necessary. An alternative diagnosis may be found, and it can inform the choice between CTPA and a V/Q scan as the next test when there is no clinical evidence of a DVT (Kirsch et al., 2022). If there is no DVT and a CXR is normal, CTPA or a perfusion scan is medically necessary. If the perfusion scan is normal, a ventilation scan may not be needed. If the CXR is abnormal, alternative causes have been considered and PE is still suspected, CTPA is considered medically necessary (Konstantinides et al., 2020).

Acute PE is treated for at least 3 months with anticoagulation. Individuals should have a follow-up visit 2 weeks to 3 months after PE. If symptoms worsen or the diagnosis is complex, follow-up may occur sooner (Rivera-Lebron et al., 2019). Whether anticoagulation is stopped after 3 months or continued indefinitely depends on whether the reduced risk of recurrent venous thromboembolism (VTE) outweighs the increased risk of bleeding (Konstantinides et al., 2020). The risk of recurrent VTE after stopping

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anticoagulation is related to the risk factor category for the index PE/VTE event. There are many genetic and acquired risk factors for VTE associated with a low, intermediate or high risk of recurrence (Konstantinides et al., 2020; Mount et al., 2022).

Patency of the pulmonary arterial bed is restored in the majority of people within the first few months, and routine CTPA imaging is considered not medically necessary (Nijkeuter et al., 2006; Konstantinides et al., 2020). Konstantinides et al recommend a transthoracic echocardiogram in those with dyspnea or functional limitation at follow up. If the probability of pulmonary hypertension is felt to be high, planar V/Q is considered the first line imaging test for suspected chronic thromboembolic pulmonary hypertension (CTEPH). CTPA should not be used as a stand alone test to rule out CTEPH. The diagnosis is based upon measurements made during right heart catheterization and mismatched perfusion defects on V/Q scan more than 3 months after an acute PE (Konstantinides et al., 2020).

MRA chest with IV contrast is an appropriate initial imaging option for suspected, recurrent or residual PE, ranked alongside CTA and V/Q scanning in this clinical setting. MRA is generally considered an alternative modality in diagnosing acute PE and is useful for diagnosing central or lobar PE, though some of its limitations include decreased sensitivity in the detection of peripheral PE, and in the PIOPED III trial, MRA was technically inadequate in 25% of patients across all centers, while in technically adequate studies it identified 57% of those with PE, with a sensitivity of 78% and specificity of 99%. Separately, V/Q scanning remains the initial diagnostic test of choice in the evaluation of residual/chronic PE, supporting a sequence where MRA serves as the next-line alternative when V/Q is nondiagnostic or unavailable (Renapurkar et al., 2025).

Background and Supporting Information

- Pulmonary embolism is found in approximately 10% of all those that present with suspicion of PE. Dyspnea, pleuritic chest pain, and tachypnea occur with about 50% incidence with leg swelling or pain just over 50% (Kahn & de Wit, 2022).
- D-dimer level has a high sensitivity and low specificity for diagnosing PE.
  - A negative D-dimer in combination with low or moderate PE risk classification has a negative predictive value approaching 100% (Konstantinides et al., 2020; Kahn & de Wit, 2022).
  - D-dimer can be falsely elevated with surgery, injury, malignancy, sepsis, diabetes, pregnancy, or other conditions where fibrin products are likely to be present (Kahn & de Wit, 2022).
- CT imaging has supplanted V/Q scanning since the latter is difficult to obtain quickly, does not provide a substantial cost savings, and does not diagnose other pulmonary pathology (Ishaaya & Tapson, 2020).

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- The decision to terminate anticoagulation treatment after previous pulmonary embolism (PE) with absent or stable symptoms is based on clinical evaluation and risk factors (Kearon et al., 2016; Konstantinides et al., 2020).
- Repeat studies do not allow one the ability to distinguish new from residual clot, with luminal diameter and clot character poorly correlated to symptoms and ECHO findings (Nijkeuter et al., 2006; Robin et al., 2023).
- Half to two thirds of individuals with primary thromboembolism have residual pulmonary artery clot at 6 months and 50% remain at one year, depending on modality at follow-up (Nijkeuter et al., 2006).
- Subsequent persistence or elevation of D-dimer is associated with increased risk of recurrent PE. ECHO and Right Heart Catheterization (RHC) can identify those with pulmonary hypertension. Yet, 1/2 of all have persistent or new pulmonary hypertension after primary thromboembolism and only half of this latter group has dyspnea at rest or exercise intolerance (Konstantinides et al., 2020).
- Of note, pregnancy is accompanied by a progressive increase in D-dimer levels, and as such, D-Dimer levels may not be helpful to rule-in or rule-out DVT/PE in pregnancy (American College of Obstetricians and Gynecologists, 2018; Kalaitzopoulos et al., 2022).

Modality	Fetal radiation exposure in mGy
CXR	0.002-0.1
V/Q	0.32 – 0.74
CTPA	0.03 – 0.66

- Compared with V/Q scan, computed tomography pulmonary angiography (CTPA) is associated with a higher radiation dose to the mother: the calculated doses to breast and lung tissue have been estimated to range from 10mGy to 60mGy and 39.5mGy, respectively, with CTPA ,as compared with 0.98mGy to 1.07mGy and 5.7mGy to 13.5mGy, respectively, with V/Q scan (Tester et al., 2020).

Pulmonary Embolism Health Equity Considerations

- Black individuals and female individuals have a higher risk of pulmonary embolism.
- Underrepresented racial/ethnic groups are less likely to undergo advanced therapies for pulmonary embolism.
- Several risk factors for pulmonary embolism (e.g., hyperestrogenic state due to oral contraceptives, pregnancy, or HRT) are exclusive to female individuals.

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- Individuals with a low socioeconomic status have reduced access to high-quality imaging centers and undergo fewer advanced interventions for pulmonary embolism.

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Pulmonary Hypertension (CH-26)

Guideline

Pulmonary Hypertension (CH-26.1)

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Pulmonary Hypertension (CH-26.1)

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- See the **Pulmonary Artery Hypertension (PAH) – Indications (CD-8.1)**

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Subclavian Steal Syndrome (CH-27)

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Subclavian Steal Syndrome (CH-27.1)

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Subclavian Steal Syndrome (CH-27.1)

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- See **Subclavian Steal Syndrome (PVD-4.1)** for concerns of Subclavian Steal Syndrome in Peripheral Vascular Disease imaging guidelines.

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Superior Vena Cava (SVC) Syndrome (CH-28)

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SVC Syndrome (CH-28.1)

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SVC Syndrome (CH-28.1)

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- For concerns of SVC syndrome, see **Upper Extremity Venous - Imaging (PVD-4.2)** in Peripheral Vascular Disease Imaging guidelines.

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Elevated Hemidiaphragm (CH-30)

Guideline

Elevated Hemidiaphragm (CH-30.1)
References (CH-30)

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Elevated Hemidiaphragm (CH-30.1)

CH.EH.0030.1.A
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Criteria

- CT Chest with contrast (CPT® 71260) and/or CT Neck with contrast (CPT® 70491) for newly diagnosed diaphragmatic paralysis or elevation when:
  - previous chest x-rays are available and reviewed to determine if the diaphragmatic elevation is a new finding, and/or
  - fluoroscopic examination (“sniff test”) to differentiate true paralysis from weakness
- CT Abdomen with contrast (CPT® 74160) to rule out liver or abdominal process if CT Chest is negative.
- Repeat advanced imaging studies in the absence of new signs or symptoms are considered not medically necessary.

Evidence Discussion

Diaphragmatic dysfunction includes eventration, weakness and paralysis. Diagnosis is based in part on static and dynamic imaging tests (Ricoy et al., 2019; Nason et al., 2012). Unilateral diaphragmatic paralysis is often asymptomatic and suspected when an elevated hemidiaphragm is found incidentally on chest x-ray (CR). CR is a simple and effective test to evaluate the pulmonary parenchyma and the diaphragm (Ricoy et al., 2019). CR has a sensitivity of 66.6% and a specificity of 44% (Laghi et al., 2021). The positive and negative predictive value of an elevated hemidiaphragm on CR for diaphragmatic dysfunction is 33% and 93%, respectively. The presence of diaphragm elevation is not necessarily a sign of dysfunction, but its absence makes it unlikely (Ricoy et al., 2019).

Flouroscopy has traditionally been the gold standard for diagnosing diaphragmatic paralysis since it can visualize the diaphragm throughout the respiratory cycle and during forced inspiratory maneuvers (i.e., the "sniff test"). Some authors now consider US to be the imaging method of choice for the evaluation of diaphragmatic dysfunction (Ricoy et al., 2019; Windisch et al., 2016). US is non-invasive, portable, quick and does not expose the individual to ionizing radiation. Absence of thickening of the diaphragm during inspiration, absence of caudal movement during normal inspiration or paradoxical movement during the sniff maneuver confirms paralysis (Laghi et al., 2021).

A common concern is whether there is an underlying serious condition in those individuals with unilateral hemidiaphragm paralysis with no evident etiology after a history, physical exam and CR. Piehler et al (1982) concluded that such individuals are unlikely to have an underlying occult malignant or neurologic condition.[3] However, Windisch et al (2016) recommended that a one-time CT chest be done if there is clinical

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suspicion of possible malignancy with damage to the phrenic nerve (Windisch et al. 2016).

Additional imaging may be needed to rule out conditions which can cause an elevated hemidiaphragm but are not associated with respiratory muscle weakness. For example, abdominal imaging can be done for suspected hepatic abscess, ascites, or splenomegaly.

Background and Supporting Information

- The right hemidiaphragm sits about 2cm higher than the left (Patel & Bechmann, 2023).
- “Eventration” is thin membranous replacement of muscle, usually on the right, as the most common cause of elevation (Nason et al., 2012; Patel & Bechmann, 2023).
- Any injury to the phrenic nerve from neck to diaphragm can lead to paralysis (Nason et al., 2012; Patel & Bechmann, 2023).
- Common phrenic causes are traumatic or surgical injury or malignancy involving the mediastinum (Patel & Bechmann, 2023).
- Any loss of lung volume or increased abdominal pressure can lead to diaphragm elevation (Patel & Bechmann, 2023).

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Thoracic Outlet Syndrome (TOS) (CH-31)

Guideline

Thoracic Outlet Syndrome (CH-31.1)

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Thoracic Outlet Syndrome (CH-31.1)

CH.TO.0031.1.A

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- For concerns of Thoracic Outlet Syndrome, see **Thoracic Outlet Syndrome (PVD-4.2)** in Peripheral Vascular Disease Imaging Guidelines.
- For concerns of Neurogenic Thoracic Outlet Syndrome, see **Brachial Plexus (PN-4.1)** in Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.

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Lung Transplantation (CH-32)

Guideline

Pre-Transplant Imaging Studies (CH-32.1)
Post-Transplant Imaging Studies (CH-32.2)
Reference (CH-32)

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Pre-Transplant Imaging Studies (CH-32.1)

CH.LT.0032.1.A
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Criteria

- Individuals on the waiting list or being considered for the lung transplant can undergo advanced imaging per that institution's protocol, or any of the studies listed below are considered medically necessary:
  - CT Chest with and without contrast (CPT® 71270), CT Chest with contrast (CPT® 71260), or CT Chest without contrast (CPT® 71250)
  - ECHO
  - Imaging Stress Test (MPI, SE, MRI) or Heart Catheterization (Right and Left); Heart catheterization can also be done after a positive stress test.
  - CTA Chest (CPT® 71275), and/or CTA Abdomen and Pelvis (CPT® 74174) and/or CTA Aorta with bilateral lower extremity run-off (CPT® 75635) is considered medically necessary (without initial ABI's and/or arterial duplex) for the following individuals:
    - prior abdominal or lower extremity vascular intervention (any timeframe is acceptable)
    - known peripheral artery disease (PAD) from prior imaging
    - current symptoms of claudication, rest pain or gangrene
  - CTA Chest (CPT® 71275) and/or CTA Abdomen and Pelvis (CPT® 74174) and/or CTA Aorta with bilateral lower extremity run-off (CPT® 75635) is considered medically necessary (after initial ABI's and/or arterial duplex) for the following individuals:
    - Initial ABI's and/or arterial duplex suggest the presence of PAD as evidenced by one of the following:
      - ABI of <0.9
      - presence of plaque
      - presence of vascular calcification, stenosis or occlusion
      - small vessel size on the duplex
  - CT Abdomen and Pelvis with or without contrast (CPT® 74177 or CPT® 74176) for determining extracorporeal membrane oxygenation (ECMO) candidacy
- Other studies that are considered medically necessary include V/Q scan and Six Minute Walk Test.
- See **Transplant (CD-1.6)** in the Cardiac Imaging Guidelines.

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Evidence Discussion

- Computed Tomography (CT) is often performed for evaluation of individuals prior to lung transplantation. CT allows for surgical planning to delineate extent of the disease and assess for any contraindications to transplant (Kim et al., 2021). CT carries the risk of exposure to iodinated contrast and ionizing radiation.
- Evaluation of donors is commonly performed by chest radiography (Calvert & Hazelton, 2020; Kim et al., 2021). Occasionally, evaluation of donors is performed by chest CT to assess for malignancy, pneumonia, emphysema, and other diseases (Kim et al., 2024).
- Cardiac evaluation with echo and/or ischemic evaluation (image stress testing or heart catheterization) is considered medically necessary prior to lung transplantation.
- Extracorporeal Membrane Oxygenation (ECMO) has been increasingly utilized for bridging prior to lung transplantation or as an adjunct procedure post-transplant (Faccioli et al., 2021; Hoetzenecker et al., 2020). Given the risk of vascular complications (Bonicolini et al., 2019), preoperative evaluation of the vasculature is reasonable. For those that are asymptomatic without previously known peripheral artery disease (PAD), initial work up with ankle-brachial index (ABI) and/or arterial duplex is considered medically necessary (Gornik et al., 2024). For those that are symptomatic, have a history of known PAD (either from prior imaging or previous vascular intervention) or initial work up has suggested the presence of PAD, advanced imaging is considered medically necessary for further evaluation (Gornik et al., 2024).

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Post-Transplant Imaging Studies (CH-32.2)

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Criteria

- CT Chest with and without contrast (CPT® 71270), CT Chest with contrast (CPT® 71260), or CT Chest without contrast (CPT® 71250) is considered medically necessary for:
  - initial post-transplant follow-up
  - suspected complication, either surgical, medical or infectious
  - worsening PFT's
  - new finding on other imaging, including chest x-ray
- CTA chest (CPT® 71275) is considered medically necessary for suspected torsion
- See **Transplant (CD-1.6)** in the Cardiac Imaging Guidelines.

Evidence Discussion

- There are no universally accepted follow-up protocols for routine post-transplant surveillance (Kim et al., 2021). CT chest is supported for initial post-transplant follow up (DeFreitas et al., 2021; Kim et al., 2021). CT carries with it the risk of exposure to iodinated contrast and ionizing radiation (Calvert & Hazelton, 2020; Kim et al., 2024) .
- Additional follow-up is based on clinical presentation, suspected complication, or findings on other imaging (DeFreitas et al., 2021; Kim et al., 2021).

Lung Transplant Health Equity Considerations

- The majority of individuals who receive lung transplants in the United States are of White race and are male. Compared to a matched person of another gender or race, these individuals have a higher likelihood or being allocated a lung transplant.

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Lung Cancer Screening (CH-33)

Guideline

LDCT: Lung Cancer Screening (CH-33.1)
Incidental Pulmonary Nodules Detected on Low Dose CT Chest (LDCT) Images (CH-33.3)
References (CH-33)

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LDCT: Lung Cancer Screening (CH-33.1)

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Criteria

- Low-dose CT Chest (CPT® 71271) for lung cancer screening† in asymptomatic individuals* annually when all of the following criteria have been met:

Screening Indications	Imaging Study
• All criteria below must be met: ◦ Individual has not received a low-dose CT lung screening in less than 12 months; and ◦ Individual has NO health problems that substantially limit life expectancy or the ability or willingness to have curative lung surgery**; and ◦ Individual is between 50 and 80 years of age; and ◦ Individual has at least a 20 pack-year history of cigarette smoking; and ◦ Currently smokes or quit within the past ≤15 years***	Low-Dose CT Chest without contrast (CPT® 71271)

† Individuals with a known diagnosis of lung cancer should be evaluated under the applicable disease-specific imaging guideline rather than under lung cancer screening criteria.See **Lung Metastases (ONC-31.1)** , **Non-Small Cell Lung Cancer – Suspected/Diagnosis (ONC-8.2)** and **Small Cell Lung Cancer – Suspected/ Diagnosis (ONC-7.1)** .

For those that no longer qualify for annual LDCT for lung cancer screening but have known lung nodules, follow criteria for follow-up under CH-16. For example, a nodule that is new on the last screening LDCT may warrant continued diagnostic CT evaluation per CH-16.2.

*Symptoms of lung cancer (e.g., hemoptysis, unexplained cough, and/or unexplained weight loss of >15 pounds in the past year) warrant diagnostic evaluation, not screening.

**This is based on a range of chest or other organ signs, symptoms or conditions which would question the member's ability to undergo surgical or non-surgical treatment if a lung cancer was discovered. For example, congestive heart failure, advanced cancer from another site or a member with COPD who uses oxygen when ambulating, would be examples of conditions that would "substantially limit life expectancy." Conversely, stable

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COPD and its symptoms, including cough, shortness of breath would not “substantially limit life expectancy.”

***NCCN (2025) and the American Cancer Society (Wolf et al., 2024) have, however, eliminated the years-since-quit limit from their eligibility criteria. The 15-year threshold is retained here, consistent with the U.S. Preventive Services Task Force (2021) recommendation.

Lung Cancer Screening Health Equity Considerations

- Black men, individuals with lower levels of education, and individuals with lower household income levels are less likely to be eligible for screening.
- Among individuals who are eligible for lung cancer screenings, Black individuals and those with a lower socioeconomic status are screened at a lower rate and have lower adherence to screening follow-up. This could be attributed to differences in referral rates among providers.
- Barriers to lung cancer screenings include:
  - Individual-level barriers, such as limited knowledge about screening, lack of education and recommendations from providers, distrust of the medical system, and lack of transportation
  - Provider-level barriers, such as lack of knowledge about screening recommendations and lack of time for shared decision-making
  - System-level barriers, such as misconceptions about screening requirements, lack of scanners, limited resources, and low reimbursement rates

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Incidental Pulmonary Nodules Detected on Low Dose CT Chest (LDCT) Images (CH-33.3)

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Criteria

- Any Lung-RADS requiring less than 1 year interval follow-up is coded as Low-Dose CT Chest (CPT® 71250) (Not CPT® 71271 which is ONLY the annual screen)
- For lung nodules, including incidental findings from studies other than screening LDCT, or if no longer qualify for screening LDCT, see **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2).**

Lung-RADS Primary Category/ Category Descriptor	Management
0: Incomplete	If findings suggestive of an inflammatory or infectious process, follow-up with LDCT (CPT® 71250) in 1-3 months
1: Negative - very low likelihood of becoming a clinically active cancer	Annual LDCT screening (CPT® 71271) in 12 months*
2: Benign appearance or behavior - very low likelihood of becoming a clinically active cancer due to size or lack of growth	Annual LDCT screening (CPT® 71271) in 12 months*
3: Probably benign finding(s) - short term follow-up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	6 month LDCT (CPT® 71250) and if unchanged on this CT it is coded as category 2 and returned to annual LDCT screening (CPT® 71271) in 12 months

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Lung-RADS Primary Category/ Category Descriptor	Management
4A: Suspicious - Findings for which additional diagnostic testing and/ or tissue sampling is recommended	PET/CT (CPT® 78815) when there is a ≥8 mm solid nodule or solid-component Follow-up with LDCT (CPT® 71250) in 3 months and if stable or decreased in size on this CT, it is coded as category 3 with follow-up LDCT (CPT® 71250) at 6 months, if stable or decreased in size on this CT, return to annual LDCT screening (CPT® 71271) in 12 months
4B or 4X: Suspicious - Findings for which additional diagnostic testing and/ or tissue sampling is recommended	CT Chest with or without contrast, PET/ CT (CPT® 78815), and/or tissue sampling depending on the probability of malignancy and comorbidities. PET/CT (CPT® 78815) when there is a ≥8 mm solid component. If there is low suspicion of lung cancer, follow-up with LDCT (CPT® 71250) in 3 months with another LDCT (CPT® 71250) in 6 months and if unchanged on this CT return to annual LDCT screening (CPT® 71271) in 12 months

For those that no longer qualify for annual LDCT for lung cancer screening but have known lung nodules, see criteria for follow-up under CH-16. For example, a nodule that is new on the last screening LDCT may warrant continued diagnostic CT evaluation per **CH-16.2**.

*If an intervening diagnostic or screening CT Chest is performed, the date of that examination resets the 12-month interval for the next annual lung cancer screening examination.

Evidence Discussion

- Low-dose computed tomography (LDCT) Chest for lung cancer screening has been shown to have sensitivity ranging from 59% to 100%, a specificity of 26.4% to 99.7%, a negative predictive value of 97.7% to 100% and a positive predictive value from 3.3% to 43.5% (U.S. Preventive Services Task Force, 2021). The benefit of lung cancer screening is early detection and treatment. The NLST trial showed a

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relative risk reduction in lung cancer mortality of 20% (U.S. Preventive Services Task Force, 2021). The radiation dose of a LDCT is typically 10% to 30% of a standard-dose CT (U.S. Preventive Services Task Force, 2021). The harms of a screening program would include false-positive results and subsequent unnecessary tests and procedures, the exposure to ionizing radiation and ensuing radiation-induced cancer, and increased anxiety and distress (U.S. Preventive Services Task Force, 2021).

- The risk of malignancy associated with a Lung CT Screening Reporting and Data System (Lung-RADS) score is as follows: a score of 2 is <1%; a score of 3 is 1%-2%; a score of 4A is 5%-15%; a score of 4B and 4X is >15% (American College of Radiology, 2022). The American College of Radiology (ACR) recommends follow up imaging of incidental pulmonary nodules detected on low dose lung cancer screening CT's based on the Lung-RADS score (American College of Radiology, 2022; Christensen et al., 2024b); however, there is limited data on the impact of screening intervals (Christensen et al., 2024b). The NLST and NELSON studies demonstrating reduction in lung cancer mortality were based on screening intervals of 1 year and 1, 3, and 5.5 years, respectively (Christensen et al., 2024b). Multiple studies have shown that the 3 month follow up recommended for Lung-RADS 4A nodules is optimal, but have raised concerns on stepwise downgrading of a stable 4A nodule to a Lung-RAD 2 (Christensen et al., 2024b). Therefore the ACR has modified follow up intervals with stepped management using the following criteria:
  - Nodules that are stable or decreased at follow-up are downgraded to the next lower Lung-RADS category (Christensen et al., 2024b).
  - Nodules that completely resolve or are proven benign after an appropriate diagnostic evaluation are reclassified based on the most concerning finding (Christensen et al., 2024b).
  - Follow-up recommendations are timed from the current examination (Christensen et al., 2024b).

For further specific details concerning Lung-RADS, see v2022 by the ACR (American College of Radiology, 2022).

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Imaging Related to Hypoglossal Nerve Stimulation (HGNS) (CH-34)

Guideline

Imaging Related to Hypoglossal Nerve Stimulation (HGNS) (CH-34.1)
References (CH-34)

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Imaging Related to Hypoglossal Nerve Stimulation (HGNS) (CH-34.1)

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Criteria

Pre-implantation

Imaging prior to initial implantation of a hypoglossal nerve stimulation device is not medically necessary, as it is not used to diagnose obstructive sleep apnea, plan surgery or predict surgical outcomes.

Post-implantation

- CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) is considered medically necessary after an inconclusive chest x-ray and EITHER of the following:
  - Respiratory sensing lead damage or displacement is suspected after device interrogation confirms malfunction
  - Prior to planned surgical revision or replacement of the respiratory sensing lead
- Routine advanced imaging is not medically necessary for explantation or replacement of the HGNS implantable pulse generator only, without lead removal.

Notes

- For concerns related to chest pain, see **Non-Cardiac Chest Pain – Imaging (CH-4.1)** .
- For concerns related to pneumothorax, see **Pneumothorax/Hemothorax (CH-19.1)** .
- For concerns related to pleural effusion, see Pleural Effusion (CH-18.1).
- For concerns related to dyspnea, see **Dyspnea/Shortness of Breath (CH-5.1)** .
- For concerns related to neck pain, see Neck Mass/Swelling/Adenopathy (Neck-5.1) and Sore Throat/Throat Pain/Odynophagia (Neck-12.1).

Background and Supporting Information

A hypoglossal nerve stimulator is a surgically implanted device that delivers stimulating electrical pulses to the hypoglossal nerve. This activates the genioglossus muscle in coordination with respiratory effort to increase upper airway patency. Hypoglossal nerve stimulation is used to treat obstructive sleep apnea.

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The first U.S. Food and Drug Administration (FDA) approval for an HGNS system was granted in April 2014 for Inspire Upper Airway Stimulation (UAS) (U.S. Food and Drug Administration, 2014). Approval was expanded in 2023 to include pediatric patients with Down syndrome between 13 and 18 years of age (U.S. Food and Drug Administration, 2023).

The Inspire system includes an implanted pulse generator. A stimulation lead is connected to the generator and tunneled superiorly to the distal ipsilateral hypoglossal nerve, which is located deep to the submandibular gland and mylohyoid muscle between the hyoid and mandible. A respiratory sensing lead is connected to the generator and tunneled inferiorly between the external and internal intercostal muscles at the second or fifth intercostal space, depending on the incision technique (Inspire Medical Systems, Inc., 2024).

The Inspire V model, approved in August 2024, incorporates respiratory sensing into the neurostimulator, eliminating the need for a separate respiratory sensing lead (Inspire Medical Systems, Inc., 2025).

A second HGNS system, the Genio System 2.1, was approved by the FDA in August 2025 for adults (U.S. Food and Drug Administration, 2025a). The system includes an implanted stimulator positioned under the chin with paddle electrodes that stimulate the bilateral terminal branches of the hypoglossal nerve (U.S. Food and Drug Administration, 2025b).

A third HGNS system, the aura6000 system, was approved by the FDA for adults in March 2026 (U.S. Food and Drug Administration, 2026a). The system is similar to Inspire V but stimulates the proximal hypoglossal nerve (U.S. Food and Drug Administration, 2026b).

Evidence Discussion

There are no standardized society guidelines addressing imaging in individuals with HGNS devices. Available literature is limited to retrospective cross-sectional studies, systematic reviews, case reports, and product manuals.

Preoperative planning does not involve routine advanced imaging. The patient selection process is based on sleep study results, body mass index, physical exam, PAP therapy intolerance, and drug-induced sleep endoscopy findings (Inspire Medical Systems, Inc., 2024; Inspire Medical Systems, Inc., 2025; U.S Food and Drug Administration, 2025).

The Inspire IV and Inspire V system implant manuals recommend obtaining at least one anterior-posterior and one lateral x-ray after implantation to document the location of all system components. Both head and neck imaging and chest x-rays may be needed to capture the entire implanted system (Inspire Medical Systems, Inc., 2024, 2025). Pneumothorax occurs most commonly intraoperatively and was reported in 4% of cases

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identified in the Manufacturer and User Facility Device Experience database (Bentan & Nord, 2024).

Serious adverse effects associated with HGNS devices are uncommon. Among 20,881 HGNS implantations performed between January 1, 2018, and March 31, 2022, the explantation rate was 0.723% and the revision rate was 1.542% during the first year. Among 5,820 implantations with 3 years of follow-up, the explantation and revision rates were 2.680% and 3.557%, respectively. Infection was the most common indication for explantation during the first year. Explantations after the first year and revisions at any time during the 3-year review were most commonly associated with device migration, lead damage, or product defects (Moroco et al., 2024).

A review of the Manufacturer and User Facility Device Experience database identified 75 cases of respiratory sensing lead migration between January 1, 2000, and December 1, 2022. Among 765 reported adverse events, 151 events, or 19.7%, were related to the respiratory sensing lead. The 75 cases of sensing lead migration represented approximately half of all reported sensing lead complications. Of these cases, 63 involved separation and migration of the sensing lead tip and 12 involved migration of the entire lead. Commonly documented symptoms included pain, dyspnea, and device malfunction manifested by a diminished respiratory sensing signal (Commesso et al., 2025).

Commesso et al. (2025) proposed an evaluation pathway for suspected respiratory sensing lead migration in an implanted individual who develops a clinical change, including chest pain, shortness of breath, or altered voltage requirements. The proposed evaluation may include device testing, chest x-ray or CT Chest, and a cardiopulmonary workup that may include electrocardiography, echocardiography, laboratory testing, and multidisciplinary consultation.

Another review of the Manufacturer and User Facility Device Experience database covering July 2014 through December 2023 identified 287 device-related adverse events. Device migration accounted for 116 events, or 40.4%. Of these migration events, 95, or 82%, involved the respiratory sensing lead. All sensing lead migration events required surgical intervention, including repositioning, reinstallation, or explantation (Bentan & Nord, 2024).

Cross-sectional studies and case reports indicate that respiratory sensing lead migration may present with chest pain, dyspnea, fatigue, pleural effusion, hydropneumothorax, or recurrent obstructive sleep apnea symptoms. Device interrogation frequently demonstrates malfunction (Commesso et al., 2025; Islam et al., 2024).

Published case reports have discussed the use of chest x-ray and CT Chest before revision or explantation of a respiratory sensing lead. In two cases, separation of the sensing lead tip from the main body of the lead was discovered during surgery and was not evident on preoperative chest x-ray. CT Chest was not performed in either case

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(Islam et al., 2024). Another case series described an individual in whom CT Chest helped localize an intramuscular respiratory sensing lead tract as the source of pain (Urban et al., 2023).

Simple explantation or replacement of the implantable pulse generator, without revision or replacement of the device leads, does not typically require advanced imaging according to the Inspire system implant manuals for Models 3028 and 3150 (Inspire Medical Systems, Inc., 2024, 2025).

MRI may be unsafe and should be carefully considered when the HGNS system is not intact, including when abandoned leads or lead fragments are present (Inspire Medical Systems, Inc., 2026).

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CH.AV.0024.1.A

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Procedure Codes Associated With Chest Imaging

Guideline

Procedure Codes Associated With Chest Imaging

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Procedure Codes Associated With Chest Imaging

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CPT Code	Description
32408	Percutaneous core needle biopsy of the lung or mediastinum, including imaging guidance when performed
70486	CT maxillofacial area without contrast
70491	CT soft tissue neck with contrast
71250	CT chest without contrast, including HRCT or diagnostic low-dose CT when applicable
71260	CT chest with contrast
71270	CT chest without and with contrast
71271	Low-dose CT chest for annual lung cancer screening
71275	CTA chest
71550	MRI chest without contrast
71552	MRI chest without and with contrast
71555	MRA chest without and with contrast
72160	CT thoracic spine with contrast
74160	CT abdomen with contrast
74174	CTA abdomen and pelvis without and with contrast

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CPT Code	Description
74176	CT abdomen and pelvis without contrast
74177	CT abdomen and pelvis with contrast
75635	CTA abdominal aorta and bilateral iliofemoral lower-extremity runoff
76376	3-D rendering with interpretation and reporting, not requiring postprocessing on an independent workstation
76377	3-D rendering with interpretation and reporting, requiring postprocessing on an independent workstation
76380	Limited or localized CT study; used in this guideline for limited CT sinus without contrast
76497	Unlisted CT procedure
76536	Ultrasound of soft tissues of the head and neck
76604	Ultrasound of the chest, including mediastinum and chest wall
76641	Breast ultrasound, unilateral, complete
76642	Breast ultrasound, unilateral, limited
76882	Limited nonvascular extremity ultrasound; used in this guideline for axillary ultrasound
76942	Ultrasound guidance for needle placement, with imaging supervision and interpretation
78306	Bone imaging, whole body
78580	Pulmonary perfusion imaging
78582	Pulmonary ventilation and perfusion imaging

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CPT Code	Description
78597	Quantitative differential pulmonary perfusion, including imaging when performed
78598	Quantitative differential pulmonary perfusion and ventilation, including imaging when performed
78815	PET with concurrently acquired CT, skull base to mid-thigh
78830	SPECT with concurrently acquired CT for attenuation correction and anatomic localization, one area
93970	Duplex scan of extremity veins, complete bilateral study
93971	Duplex scan of extremity veins, unilateral or limited study

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General Guidelines (HD-1)

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Abbreviations for Head Imaging Guidelines

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Abbreviations for Head Imaging Guidelines	
ACTH	adrenocorticotropic hormone
AD	Alzheimer's Disease
ADH	antidiuretic hormone
AION	arteritic ischemic optic neuritis
AVM	arteriovenous malformation
CBCT	cone-beam computerized tomography
CMV	cytomegalovirus
CSF	cerebrospinal fluid
CT	computed tomography
CTA	computed tomography angiography
DNA	deoxyribonucleic acid
DWI	diffusion weighted imaging (for MRI)
EEG	electroencephalogram
ENT	ear, nose, throat
ESR	erythrocyte sedimentation rate
FDG	fluorodeoxyglucose
FSH	follicle-stimulating hormone

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Abbreviations for Head Imaging Guidelines	
FTD	Frontotemporal Dementia
GCA	giant cell arteritis
GCS	Glasgow Coma Scale
HIV	human immunodeficiency virus
LH	luteinizing hormone
MMSE	mini mental status examination
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging
MRN	magnetic resonance neurography
MS	multiple sclerosis
MSI	magnetic source imaging
NAION	non-arteritic ischemic optic neuritis
NPH	normal pressure hydrocephalus
PET	positron emission tomography
PML	progressive multifocal leukoencephalopathy
PNET	primitive neuro ectodermal tumor
PWI	perfusion weighted imaging (for MRI)
SAH	subarachnoid hemorrhage
SIADH	syndrome of inappropriate antidiuretic hormone secretion

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Abbreviations for Head Imaging Guidelines	
SLE	systemic lupus erythematosus
TIA	transient ischemic attack
TMJ	temporomandibular joint disease
TSH	thyroid-stimulating hormone
VBI	vertebrobasilar insufficiency
VP	ventriculoperitoneal
XRT	radiation therapy

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General Guidelines (HD-1.0)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination including a neurological examination since the onset or change in symptoms, and appropriate laboratory studies should be performed prior to considering the use of an advanced imaging (CT, MR, Nuclear Medicine) procedure.
  - A pertinent clinical evaluation furnished via telehealth, since the onset or change in symptoms, is treated the same as an in-person clinical evaluation.
  - An exception to a pertinent clinical evaluation can be made if the individual is undergoing a guideline-supported, scheduled follow-up imaging evaluation.
    - Scheduled follow-up of known problems such as, multiple sclerosis, tumors, or hydrocephalus, scheduled surveillance with no new symptoms, screening asymptomatic individual due to family history or otherwise meet criteria for repeat imaging, as well as appropriate laboratory studies and non-advanced imaging modalities
  - A detailed neurological exam is required prior to advanced imaging except in the following scenarios:
    - Tinnitus, TMJ, sinus or mastoid disease, ear pain, hearing loss, eye disease, pituitary disease, or epistaxis. (A pertinent clinical evaluation since onset of symptoms is still required).
    - The request is from a neurologist, neurosurgeon, neuro-ophthalmologist, endocrinologist, gynecologist, otolaryngologist, or ophthalmologist who has seen the individual since onset of symptoms, or any provider in consultation with one of the above specialists.
- Other meaningful contact (telephone call, electronic mail, or messaging) since the onset or change in symptoms, with an established individual can substitute for a face-to-face clinical evaluation.
- CT Head contrast as requested (CPT® 70450 OR CPT® 70460 OR CPT® 70470) is considered medically necessary when MRI is contraindicated.

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following:

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safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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General Guidelines – Anatomic Issues (HD-1.1)

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Criteria

- If two studies using the same modality both cover the anatomic region of clinical interest, only one is generally needed, with the exception of the following scenarios:
  - CT Maxillofacial (CPT® 70486, CPT® 70487, or CPT® 70488) or CT Orbit/Temporal bone (CPT® 70480, CPT® 70481, or CPT® 70482): both cover the structures of the orbits, sinuses, and face. Two separate imaging studies are only supported if there is suspicion of simultaneous involvement of more posterior lesions, especially of the region involving the middle or inner ear.
  - Pituitary Gland: one study (either MRI Brain [CPT® 70553] or MRI Orbit/Face/Neck [CPT® 70543]) is adequate to report the imaging of the pituitary. If a previous routine MRI Brain was reported to show a possible pituitary tumor, a repeat MRI with dedicated pituitary protocol is considered medically necessary.
  - Internal Auditory Canal: (IAC) MRI can be reported as a limited study with one code from the set (CPT® 70540, CPT® 70542, or CPT® 70543), but should not be used in conjunction with MRI Brain codes (CPT® 70551, CPT® 70552, or CPT® 70553) if IAC views are performed as part of the brain.
  - Mandible (jaw): CT Maxillofacial (CPT® 70486, CPT® 70487, or CPT® 70488) or CT Neck (CPT® 70490, CPT® 70491, or CPT® 70492) can be used to report imaging of the mandible. CT Neck will also image the submandibular space.
    - If MRI is considered medically necessary, MRI Orbit/Face/Neck (CPT® 70540, CPT® 70542, or CPT® 70543) can be used to report imaging of the mandible and submandibular space.
    - MRI Temporomandibular Joint(s) (TMJ) is reported as CPT® 70336. This code is inherently bilateral and should not be reported twice on the same date of service.

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General Guidelines – Modality (HD-1.2)

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Criteria

- MRI is preferable to CT for most indications. For exceptions, See **General Guidelines – CT Head (HD-1.4)**
- MRI is considered medically necessary for these indications following an initial CT:
  - MRI Brain without and with contrast (CPT® 70553) to follow-up abnormalities seen on CT Head without contrast (CPT® 70450) when a mass, lesion, or infection is found.
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) to follow-up abnormalities seen on CT Head without contrast (CPT® 70450) when there is suspected Multiple Sclerosis or other demyelinating disease.
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) to follow up on stroke or TIA when initial CT Head was done on emergent basis.
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) for evaluation of new onset seizures.

Evidence Discussion (HD-1.2)

- MRI of the brain is the appropriate initial imaging study for diagnosis, characterization and surveillance of a variety of neurologic conditions, including, but not limited to: neoplastic conditions, evaluation of the brain parenchyma, meninges, ischemia and infarction, neurodegenerative disorders, hydrocephalus, demyelinating conditions, post-traumatic brain injury, inflammatory and autoimmune disorders, and infectious disorders (ACR, 2024a).
- MRI Brain has some benefit over CT for determining age of intracranial hemorrhage, early stroke (via Diffusion imaging sequences), and detection of micro hemorrhage (ACR, 2024a; Kubal, 2012; Burgess & Kidwell 2011, Kidwell et al. 2004).
- MRI is also considered medically necessary for further characterization of abnormalities detected on other imaging tests such as CT or sonography (ACR, 2024a).
- Limitations to MRI include artifacts due to motion and susceptibility effects, contrast complications, contraindication due to ferromagnetic devices or implants. Additionally, severe claustrophobia may require sedation in order to complete the study (Kanal et al., 2013).

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General Guidelines – MRI Brain (HD-1.3)

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Criteria

- MRI Brain with contrast (CPT® 70552) should not be ordered except to follow-up on a very recent abnormal or equivocal non-contrast MRI Brain.
- After an MRI Brain without contrast (CPT® 70551), a follow up MRI Brain with contrast (CPT® 70552) may be performed at the discretion of a neurologist, a neurosurgeon, or a neuro-ophthalmologist, or any provider in consultation with a neurologist, neurosurgeon, or neuro-ophthalmologist, and/or at the recommendation of the radiologist.
- Gadolinium is relatively contraindicated in pregnancy, MRI Brain without contrast (CPT® 70551) is supported.
- The AMA CPT® manual does not describe nor assign any minimum or maximum number of sequences for any CT or MRI study. Both MRI and CT imaging protocols are often influenced by the individual clinical situation of the individual and additional sequences are not uncommon. There are numerous MRI sequences that are performed to evaluate specific clinical questions, and this technology is constantly undergoing development. Additional sequences, however, are still performed and coded under the routine MRI Brain CPT® 70551, CPT® 70552, or CPT® 70553.

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General Guidelines – CT Head (HD-1.4)

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Criteria

- Scenarios in which MRI is contraindicated (e.g., pacemakers, ICDs, cochlear implants, aneurysm clips, orbital metallic fragments, etc.)
- In urgent cases, CT Head, contrast as requested is considered medically necessary [CT Head without contrast (CPT® 70450) or CT Head with contrast (CPT® 70460) or CT Head without and with contrast (CPT® 70470)]
- CT Head without contrast (CPT® 70450) is considered medically necessary for:
  - mass effect
  - blood/blood products
  - urgent/emergent settings due to availability and speed of CT
  - trauma
  - recent hemorrhage, whether traumatic or spontaneous
  - bony structures of the head evaluations including dystrophic calcifications
  - hydrocephalus evaluation and follow-up (some centers use limited non-contrast "fast or rapid MRI" (CPT® 70551) to minimize radiation exposure in children).
  - prior to lumbar puncture in individuals
  - evaluation of optic disc edema and/or papilledema, a non-contrast CT Head is useful to assess for space-occupying processes such as intracranial hemorrhage, mass effect, and hydrocephalus, See **Papilledema/Pseudotumor Cerebri (HD-17.1)** and **Eye Disorders and Visual Loss (HD-32.1)**

Evidence Discussion (HD-1.4)

- CT head is the preferred modality for evaluation of bony structures, acute intracranial hemorrhage, trauma, and detection of abnormalities associated with calcifications (Kubal, 2012; Kidwell et al., 2011; ACR 2020a; ACR 2021a).
- This modality is also useful for follow-up of intracranial hemorrhage, hydrocephalus shunts, and post-operative follow-up (Kubal, 2012; Kidwell et al., 2011; ACR 2020a; ACR 2021a).
- CT head provides more rapid detection of intracranial abnormalities in urgent or emergent situations (ACR 2020a; ACR 2021a; Barnes 2011).
- CT has less motion artifact than MRI due to its faster acquisition and better spatial resolution than MRI.
- Limitations of CT include lower early detection rates for occult fracture than MRI, ionizing radiation exposure, and lower contrast resolution than MRI.

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General Guidelines – CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5)

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Criteria

Angiography imaging refers to both arterial and venous imaging. Vascular angiography is not the same imaging as diagnostic MRI.

- MRA Head is performed without contrast (CPT® 70544), with contrast (CPT® 70545), or without and with contrast (CPT® 70546)
- MRA Neck is performed without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549), depending on facility preference and protocols and type of scanner
- CTA Head is performed without and with contrast (CPT® 70496)
- CTA Neck is performed without and with contrast (CPT® 70498)
- CTA Head and Neck is performed without and with contrast (CPT® 70471). This code must be substituted when both CTA head and neck are performed together during the same session.
- CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography).
  - If arterial and venous CT or MR studies are both performed in the same session, only **one** CPT® code is used to report both procedures.
  - If an arterial CTA or MRA study has been performed and subsequently a repeat study is needed to evaluate the venous anatomy, then this study is considered medically necessary.
  - If a venous CTV or MRV study has been performed and subsequently a repeat study is needed to evaluate the arterial anatomy, then this study is considered medically necessary.
- Medically necessary indications for CTA or MRA Head and Neck vessels include, but are not limited to the following:
  - Pulsatile tinnitus
  - Hemifacial spasm if consideration for surgical decompression
  - Evaluation of stroke or TIA (see **Stroke/TIA (HD-21.1)**) including collateral assessment

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- Trigeminal neuralgia (see **Trigeminal Neuralgia and other Centrally Mediated Facial Pain Syndromes (HD-10.1)**)
- Cerebral venous sinus thrombosis (see **Cerebral Venous Sinus Thrombosis (HD-21.8)** and **Papilledema/Pseudotumor Cerebri (HD-17.1)**)
  - MRA without and with contrast is considered medically necessary for venous sinus thrombosis to differentiate total from subtotal occlusion.
- Aneurysm suspected with acute "thunderclap" headache syndrome and appropriate screening or evaluation of known subarachnoid hemorrhage and pseudoaneurysms (appropriate to limit CTA to include only the head to avoid unnecessary radiation to the individual)
- Non-inflammatory vasculopathy, including radiation vasculopathy
- Traumatic vascular injuries
- Vascular malformations, vascular anatomic variants, and fistulas
- Arterial dissections
- Tumors of vascular origin or involving vascular structures
- Surgical and radiation therapy localization, planning, and neuronavigation
- Evaluation for vascular intervention and follow-up including post-surgical/post-treatment vascular complications
- Intracranial pre-operative planning if there is concern of possible vascular involvement or risk for vascular complication from procedure
- Vasculitis and collagen vascular disease
- Eagle Syndrome - Dynamic/positional CTA to assess for vascular compression (also known as bow-hunter's syndrome) (see **Eagle Syndrome (Neck-10.3)**)
- NOTE: Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebral-basilar system.

- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) is considered medically necessary for follow-up of aneurysm clipping or coiling procedures (see **Intracranial Cerebral Aneurysms (HD-12.1)**)
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) **AND/OR** MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498) is considered medically necessary if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon)
  - There are high-risk scenarios including, but not exclusive to, fibromuscular dysplasia (FMD), Marfan disease, motor vehicle accident (MVA) with whiplash, or chiropractic manipulation.
- Other vascular imaging indications for headaches require additional information.
  - See **Stroke/TIA (HD-21.1)**, **Sudden Onset of Headache (HD-11.3)**, **New Headache Onset Older than Age 50 (HD-11.7)**, **Abnormal Blood Clotting**

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(HD-11.9), **Pregnancy (HD-11.10)**, **Physical Exertion (HD-11.11)**, and **Systemic Infections (HD-11.13)**

Evidence Discussion (HD-1.5)

- Indications for cervicocerebral computed tomography angiography (CTA) of the head and neck vessels include the diagnosis, characterization and/or surveillance of a variety of vascular conditions, including, but not limited to, arterial aneurysms, dissections, ischemic stroke and transient ischemic attacks, vasculitis, traumatic vascular injuries, pulsatile tinnitus, tumors of vascular origin, and prior to surgical intervention (ACR 2020b). CTA may refer to arterial vessels (CTA) or evaluation of venous structures (CTV) (ACR, 2020b).
- CTA may be used as the initial imaging modality or as a follow up study for characterizing known disease or assessing changes over time (ACR, 2020b).
- Depending on the indication, CTA may be limited to the head to avoid unnecessary radiation to the individual. Examples include surveillance of intracranial aneurysms (that are not located in the posterior circulation) (ACR, 2020b).
- Risks of CTA include exposure to ionizing radiation; thus, magnetic resonance angiography (MRA) is available as an alternative to reduce radiation exposure. In addition, MRA is an alternative for individuals with iodinated contrast allergies or other contraindications to iodinated contrast (ACR, 2020b; ACR 2020c).
- Magnetic resonance angiography (MRA) indications also cover a variety of vascular conditions of the head and neck, for diagnosis, characterization, and surveillance, and may be used to evaluate either arterial (MRA) or venous structures (MRV) (ACR, 2020c).
- MRA, as an alternative modality, is noninvasive, and does not require iodinated contrast (Bailey & Robinson, 2007). Limitations include artifacts due to motion, slow or turbulent flow, and susceptibility effects, and claustrophobia (Bailey & Robinson, 2007). MRA may be performed without contrast or with gadolinium contrast (Bailey & Robinson, 2007). Gadolinium contrast administration is limited to those without renal impairment or known gadolinium contrast allergy (Bailey & Robinson, 2007). Additionally, MRA may not be a feasible option for those with contraindications to MRI such as incompatible pacemakers, cochlear implants, neurostimulators, or other devices (Expert Panel on MR Safety, 2013). In these scenarios, CTA may be the appropriate alternative (ACR, 2020b).

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General Guidelines – PET Coding Notes (HD-1.6)

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- Metabolic Brain PET should be reported as Metabolic Brain PET (CPT® 78608)
- Amyloid Brain PET should be reported as limited PET (CPT® 78811) or limited PET/CT (CPT® 78814)

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General Guidelines – Other Imaging Situations (HD-1.7)

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Persistent Nausea and Vomiting

Screening for Metallic Fragments Before MRI

Gender Affirming Care Head and Neck Surgical Planning

3D Rendering

AI-powered Connectomic Analysis of the Brain

Eagle Syndrome

CSF Leak with or without Headache

Evidence Discussion (HD-1.7)

Persistent Nausea and Vomiting

Criteria

- Nausea and vomiting, persistent, unexplained and a negative GI evaluation: MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary.

Screening for Metallic Fragments Before MRI

Criteria

- Screening for metallic fragments before MRI should be done initially with plain x- ray.
  - The use of CT Orbital to rule out orbital metallic fragments prior to MRI is rarely necessary.
  - Plain x-rays are generally sufficient; x-ray detects fragments of 0.12 mm or more, and CT detects those of 0.07 mm or more.
- Plain x-ray is generally sufficient to screen for aneurysm clips.

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Gender Affirming Care Head and Neck Surgical Planning

Criteria

- For gender affirming care procedure planning:
  - **ANY** or **ALL** the following pre-operative CT requests are considered medically necessary if the individual has a health plan benefit covering the gender affirming surgeries:
    - CT Maxillofacial without contrast (CPT® 70486)
    - CT Orbits/Temporal bone without contrast (CPT® 70480)
    - CT Neck with contrast (CPT® 70491)
    - CT Head without (CPT® 70450)
    - 3D rendering (CPT® 76376 or CPT® 76377)
  - Pre-operative imaging is not supported if the gender affirming surgeries are not health plan covered benefits.
  - Requesting providers are encouraged to confirm eligibility with the member's health plan prior to service.

3D Rendering

Criteria

- CPT® 76376 (3D rendering not requiring imaging post-processing on an independent workstation) or CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) is considered medically necessary in **ANY** of the following clinical scenarios:
  - Bony conditions:
    - Evaluation of congenital skull abnormalities in newborns, infants, and toddler (usually for pre-operative planning)
    - Complex joint fractures or pelvis fractures
    - Spine fractures (usually for pre-operative planning)
    - Complex facial fractures
  - Pre-operative planning for other complex surgical cases
  - Cerebral angiography: 3D rendering when performed in conjunction with conventional angiography (i.e., conventional 4 vessel cerebral angiography).
    - See **Cerebral Aneurysms (HD-12.1)**, **Arteriovenous Malformations (AVMs) and Related Lesions (HD-12.2)**, **Stroke/TIA (HD-21.1)**, and **Cerebral Vasculitis (HD-22.1)**

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- 3D Rendering (CPT® 76376 or CPT® 76377) for surgical planning and surgical follow up after craniotomy when ordered by surgical specialist or any provider in consultation with a surgical specialist.
- 3D Rendering indications in pediatric head imaging are identical to those in the general imaging guidelines.
- See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

AI-powered Connectomic Analysis of the Brain

Criteria

AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T.

- These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.

Eagle Syndrome

- See **Eagle Syndrome (Neck-10.3)** in the Neck Imaging Guidelines.
- See **General Guidelines - CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5)** for vascular imaging related to Eagle Syndrome.

CSF Leak with or without Headache

- CSF Leak with or without headache, see **Low-Pressure Headache and CSF Leak (HD-11.15)**

Evidence Discussion (HD-1.7)

Neurologic evaluation of Nausea and vomiting

- In the evaluation of persistent, unexplained nausea and vomiting, an MRI Brain is supported after a negative GI evaluation (Hornby, 2001; Shosha et al., 2018; Singh et al., 2015; Johns & Lawrence, 2024). Nausea and vomiting were reported as the initial symptom of a brain tumor in 5% of brain tumor cases (Alther et al., 2020). During the time course until diagnosis, nausea and vomiting is present in 25% of brain tumor cases (Alther et al., 2020).

Screening for metallic fragments

- The American College of Radiology White Paper on MR safety advised that all individuals who have a history of orbit trauma by a potential ferromagnetic foreign body for which they sought medical attention are to have their orbits cleared by

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either a plain x-ray orbit films (2 views) or by a radiologist's review and assessment of a prior CT or MR images obtained since the suspected traumatic event (Bailey & Robinson, 2007; Kanal et al., 2002). Screening for the presence of a metallic aneurysm clips with plain films of the skull is also recommended (Kanal et al., 2002). Although CT is more sensitive than plain films, the radiation dose is greatly increased (Bailey & Robinson, 2007).

3D Rendering

- 3D/rotational angiography, as part of cerebral angiography, is also useful for radiation dose reduction during diagnostic and interventional neuroradiology procedures (ACR 2021b).

AI-powered Connectomic Analysis of the Brain

- Limitations to the application of this new technology include the need for meta-analysis and/or systematic review studies and external validation studies. Currently studies are based on retrospective cohorts of patients (Magnani et al., 2022).

Gender affirming head and neck surgeries

- As the field has evolved, more centers are using frontal sinus setback as 90% of individuals require frontal bone osteotomy and setback, based on their frontal bone anatomy. (Dang 2021, Louis 2021) For individuals requiring bony manipulation, a fine-cut, non-contrast craniofacial CT scan from the vertex to the hyoid bone is used to map the bony framework (Dang et al., 2021; Louis et al., 2021). Virtual surgical planning improves efficiency, safety, and accuracy for frontal sinus setback and mandibular angle reduction surgeries (Gray et al., 2019). CT Neck is considered medically necessary for laryngoplasty surgeries (Capitán, et al., 2020).

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Taste and Smell Disorders (HD-2)

Guideline

Taste and Smell Disorders (HD-2.1)
References (HD-2)

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Taste and Smell Disorders (HD-2.1)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) **AND/OR** MRI Orbit/Face/Neck without contrast (CPT® 70540) or MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary with unexplained unilateral or bilateral anosmia (inability to perceive odor) or dysgeusia (complete or partial loss of taste)
- CT Maxillofacial (CPT® 70486, CPT® 70487 or CPT® 70488) is considered medically necessary initially if sinus or facial bone disorders are suspected
- For individuals who test positive for SARS-CoV-2 (see: **Neuro-COVID-19 and Sars-CoV-2 Vaccines (HD-14.2)** and **Stroke/TIA (HD-21.1)**)

Evidence Discussion (HD-2.1)

Initial imaging of the olfactory nerve and pathway for unexplained unilateral or bilateral anosmia or for dysgeusia should utilize MRI brain and/or MRI orbits, face and neck (ACR, 2022; ACR, 2024). These imaging studies are supported by clinical evidence for the identification and characterization of a potential cranial nerve lesion (ACR, 2022; ACR, 2024). CT of the sinuses and face may be superior to identify fractures, inflammatory sinus disease, and other bony lesions in some cases (ACR, 2022).

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Ataxia (HD-3)

Guideline

Ataxia (HD-3.1)
References (HD-3)

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Ataxia (HD-3.1)

HD.AX.0003.1.A
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Criteria

- Common manifestations include poor coordination, an abnormal (including wide-based) gait, abnormal finger to nose testing, abnormal rapid alternating movements, abnormal eye movements, and/or difficulty with navigation of stairs and around corners.
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary in all individuals with ataxia:
  - MRI Cervical without contrast or without and with contrast (CPT® 72141 or CPT® 72156) **AND/OR** MRI Thoracic without contrast or without and with contrast (CPT® 72146 or CPT® 72157) **AND/OR** MRI Lumbar Spine without contrast or without and with contrast (CPT® 72148 or CPT® 72158) may be added if spinal disease is suspected
  - If these symptoms are acute and stroke is suspected, see **Stroke/TIA (HD-21.1)**
  - If MS is suspected, see **Multiple Sclerosis (MS) (HD-16.1)**
  - CT Head without contrast (CPT® 70450) **AND/OR** CT Orbit/Temporal Bone without contrast (CPT® 70480) is considered medically necessary in addition if these symptoms are acute following head trauma, (see also: **Head Trauma (HD-13.1)**)
- If brain tumor is suspected, see **Primary Central Nervous System Tumors (ONC-2.1)** in the Oncology Imaging Guidelines.
- For suspected Normal Pressure Hydrocephalus, see **Normal Pressure Hydrocephalus (NPH) (HD-8.4)**

Background and Supporting Information

- In general, MRI is preferred over CT, unless there is a history of acute trauma or contraindication to MRI. For all other causes, MRI provides better visualization of the cerebellum and posterior fossa.

Evidence Discussion (HD-3.1)

- MRI Brain is the preferred initial imaging modality for evaluation of ataxia when a central nervous system cause is suspected (Wang et al., 2023; ACR 2024). MRI of the spinal cord, to include the cervical and thoracic spine, may also be added if clinically indicated (Wang 2023 et al.; Expert Panel on Neurologic Imaging, 2019).
- CT head is not recommended for the initial evaluation of non-traumatic ataxia due to inferior soft tissue resolution when compared to MRI Brain. In addition, MRI Brain

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provides better visualization of the cerebellum and posterior fossa and is more sensitive for the detection of posterior fossa infarcts (Wang et al., 2023)

- In general, MRI is preferred over CT, unless there is a history of acute trauma or a contraindication to MRI (Wang et al., 2023).

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Mental Health Disorders and Mental Status Change (HD-4)

Guideline

Autism Spectrum Disorders (HD-4.0)
Mental Health Related Disorders (HD-4.1)
Mental Status Change (HD-4.2)
References (HD-4)

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Autism Spectrum Disorders (HD-4.0)

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Criteria

- This group of diagnoses, including Asperger syndrome, is classified as pervasive development disorders (PDD). These diagnoses are established on clinical criteria, and no imaging study can confirm the diagnosis.
- Comprehensive evaluation for autism might include history, physical exam, audiology evaluation, speech, language, and communication assessment, cognitive and behavioral assessments, and academic assessment.
  - MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for **ANY** of the following:
    - New or worsening cognitive decline or focal neurologic findings documented on a pertinent physical
  - PET imaging is considered not medically necessary in the evaluation of individuals with autism spectrum disorders.

Evidence Discussion (HD-4.0)

- While the diagnosis of Autism Spectrum Disorder is based on behavioral signs and symptoms, MRI Brain without and with contrast is medically necessary for new or worsening focal neurological findings and/or loss of developmental milestones and/or regression. In these clinical situations, advanced imaging may be used to adjust an individual's treatment plan, without which their development may continue to regress (Baker & Jeste, 2015).
- PET is considered not currently considered medically necessary in the evaluation of individuals with autism spectrum disorder. PET imaging in this scenario would unnecessarily expose individuals to radiation and provide no clinical utility related to autism spectrum disorder (Zürcher et al., 2015).

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Mental Health Related Disorders (HD-4.1)

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Criteria

- Mental health diagnoses, including Attention Deficit Hyperactivity Disorder (ADHD), do not routinely require advanced imaging.
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **OR** CT Head without contrast (CPT® 70450) is considered medically necessary for the exceptions listed below:
  - Acute mental status change, disturbance in consciousness or arousal state
  - Psychotic disorders (including schizophrenia), bipolar disorder and related disorders in the following clinical presentations:
    - Acute psychosis
    - Late onset over age 40
    - Presentation of acute psychiatric symptoms with comorbid serious medical illness
    - Non-auditory hallucinations (e.g., visual, tactile, olfactory) with no known etiology
    - Nonresponse to adequate medication trials
    - Symptoms of an organic brain disorder (e.g., focal deficits, severe headache, or seizures)
- Prior to electroconvulsive therapy (ECT) treatment, the following are considered medically necessary to screen for intracranial disease: MRI Brain without contrast (CPT® 70551) **OR** CT Head without contrast (CPT® 70450)
- Deep Brain Stimulation Therapy for psychiatric disorders is considered not medically necessary, except for medically refractory Obsessive Compulsive Disorder (OCD).
  - Medically necessary imaging prior to Deep Brain Stimulation (DBS) therapy for medically refractory Obsessive Compulsive Disorder (OCD):
    - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR** unlisted CT procedure code (CPT® 76497)

Evidence Discussion (HD-4.1)

- There is no role for advanced imaging in mental health workup (including ADHD). Unnecessary imaging has detrimental effects in that it provides no positive impact on outcomes/management and does expose individuals to unnecessary radiation, contrast, and financial strain.

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- It would be appropriate to utilize Advanced imaging (CT or MRI) in the following conditions:
  - Acute mental status change, disturbance in consciousness or arousal state (Soares et al., 2024).
  - Psychiatric disorders with the following clinical presentations (Soares et al., 2024):
    - Acute psychosis
    - Late onset over age 40
    - Presentation of acute psychiatric symptoms with comorbid serious medical illness
    - Non-auditory hallucinations of unknown etiology
    - Nonresponse to adequate medication trials
    - Symptoms of an organic brain disorder (e.g., focal deficits, severe headache, or seizures)
- Advanced imaging may be considered medically necessary for electroconvulsive therapy clearance and prior to deep brain stimulation for medically refractory obsessive compulsive disorder (Staudt et al., 2021).

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Mental Status Change (HD-4.2)

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Criteria

After a detailed history, which includes onset, duration, and timeframe (i.e., constant vs intermittent) **AND** bedside neurologic exam that includes a mental status evaluation providing a description of the level of alertness, other characteristics and/or cognitive testing, the following are considered medically necessary:

Indication	Medically Necessary Imaging
Acute, subacute, or worsening mental status change, initial or repeat imaging	• CT Head without contrast (CPT® 70450) **OR** • If setting is urgent, CT Head contrast as requested (CPT® 70450 OR CPT® 70460 OR CPT® 70470) **OR** • If MRI is contraindicated, CT Head contrast as requested (CPT® 70450 OR CPT® 70460 OR CPT® 70470) • *CT Head permitted even with prior MRI Brain imaging* **OR** • MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) • *MRI Brain permitted even with prior head CT imaging*

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Indication	Medically Necessary Imaging
Additional imaging may be considered medically necessary as listed below : • Sudden language, focal motor, or sensory deficit – **Stroke/TIA (HD-21.1)** • Headache – **Headaches with Red Flags (HD-11.2)** • Hypertensive urgency – **Stroke/TIA (HD-21.1)** and **Sudden Onset of Headache (HD-11.3)** • Fever/tachycardia, possible meningitis, or other CNS infection – **CNS and Head Infection (HD-14.1)** • COVID-19 – **Neuro-COVID-19 and Sars-CoV-2 Vaccines (HD-14.2)** • Coagulopathy or anticoagulant use- **Abnormal Blood Clotting (HD-11.9)** • Pregnancy or post-partum – **Pregnancy (HD-11.10)** • Known malignancy – **Low Grade Gliomas (ONC-2.2)**, **High Grade Gliomas (ONC-2.3)** and **Brain Metastases (ONC-31.3)** • Trauma- **Head Trauma (HD-13.1)** • Non-auditory hallucinations – **Mental Health Related Disorders (HD-4.1)** • Suspected increased intracranial pressure – **Papilledema/Pseudotumor Cerebri (HD-17.1)** and **Hydrocephalus Shunts (HD-11.14)** • Seizure/suspected seizure – **Epilepsy/ Seizures (HD-9.1)**	*See relevant guideline

Background and Supporting Information

This section refers to acute/subacute mental status change, which generally involves signs and symptoms which begin over minutes to days, and includes changes in behavior and alertness, agitation, and/or confusion – as opposed to chronic, progressive cognitive decline, as in dementia.

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Acute mental status change or encephalopathy is characterized by changes in behavior or alertness, agitation, confusion, as opposed to chronic, progressive cognitive decline, such as dementia-related disorders.

Delirium and psychosis are defined as follows:

- Delirium is a disorder of acute onset involving deficits in attention, awareness, and cognition that fluctuate in severity over time. These are often associated with psychomotor disturbance, altered sleep cycle, and emotional variability. These disturbances may be hyperactive (restlessness, agitation) or hypoactive (psychomotor retardation, lethargy) and there may be accompanying fever and/or autonomic symptoms (tachycardia, sweating), depending on the underlying cause.
- Psychosis is a disorder of impaired reality, characterized by hallucinations, delusions, or both, without insight into their pathologic nature. It may be associated with disorganized behavior, thought blocking, illogicality, tangentiality, perseveration, and/or neologisms.

The purpose of the initial assessment is to characterize the etiology. This may include toxic/metabolic (e.g., hypoglycemic, drug exposures), structural (e.g., trauma, stroke, hypoxic-ischemic, hydrocephalus, tumor), paroxysmal (e.g., seizure, psychiatric), and inflammatory (e.g., infectious, autoimmune).

Of note, even a seemingly mild, reversible brain insult superimposed upon a chronic pathophysiologic process may cause a sudden mental status change, and head imaging may or may not be necessary, depending on the provider's pre-test suspicion of a significant new diagnosis.

Vagal Nerve Stimulators (VNS), which are FDA approved for treatment of depression, are included among potential treatments, which also include medication trials.

Evidence Discussion (HD-4.2)

- Altered mental status (AMS) is not a diagnosis, but rather a term for symptoms of acute or chronic disordered mentation, including memory impairment, confusion, disorientation, lethargy, drowsiness, somnolence, unresponsiveness, agitation, altered behavior, inattention, hallucinations, delusions, and psychosis (Soares et al., 2024).
- Advanced brain imaging is supported for acute onset of mental status change, or worsening symptoms in the setting of a known intracranial process with MRI Brain with or without a previous CT Head (Uzelac, 2020).
- Advanced imaging supported for mental status change with precipitating factors including suspected seizure, COVID-related symptoms, head trauma, stroke, mass, or known malignancy, suspected increased intracranial pressure, intracranial infection, hypertensive emergency, presence of coagulopathy, pregnancy and postpartum period, associated headache (Soares et al., 2024).

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- According to the ACR, advantages of MRI for altered mental state include: 1) higher sensitivity for detection of ischemia, encephalitis, subtle cases of subarachnoid hemorrhage (SAH); and 2) enhancement of pathology compared with CT. The disadvantages of MRI in this clinical scenario are the same as with MRI in general, including individual inconvenience (longer examination time), imaging quality is susceptible to individuals' movements, and implanted devices that are not MRI safe (Soares et al., 2024).

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Chiari and Skull-Base Malformations (HD-5)

Guideline

Chiari Malformations (HD-5.1)
Chiari II Malformations (Arnold Chiari Malformation) (HD-5.2)
Chiari III and IV Malformations (HD-5.3)
Basilar Impression/Basilar Invagination (HD-5.4)
Platybasia (HD-5.5)
Evidence Discussion (HD-5)
References (HD-5)

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Chiari Malformations (HD-5.1)

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Criteria

Indication	Medically Necessary Imaging
Initial evaluation for suspected or known Chiari malformations	• MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRI Cervical Spine without contrast (CPT® 72141) or MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) or MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR** • MRI Lumbar Spine without contrast (CPT® 72148) or MRI Lumbar Spine without and with contrast (CPT® 72158)
Repeat imaging for one of the following: • New or worsening signs or symptoms • Surgical procedure is actively being considered • At the discretion of or in consultation with a neurologist and/or neurosurgeon coordinating the individual's care	• MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRI Cervical Spine without contrast (CPT® 72141) or MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) or MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR** • MRI Lumbar Spine without contrast (CPT® 72148) or MRI Lumbar Spine without and with contrast (CPT® 72158)

- Familial screening is considered NOT medically necessary for Chiari Malformations.
- For CSF flow imaging, see **CSF Flow Imaging (HD-24.4)**
- For CT head imaging indications, see **General Guidelines CT Head (HD-1.4)**.

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Background and Supporting Information

Chiari I malformations involve caudal displacement or herniation of the cerebellar tonsils. Chiari I may be associated with syringomyelia and rarely with hydrocephalus. Most cases are asymptomatic and discovered incidentally on a head scan performed for another indication. When symptoms are present, they are usually nonspecific but can include headache, lower cranial nerve palsies, or sleep apnea.

Chiari II malformations are more severe than Chiari I malformations. These individuals usually present at birth. Myelomeningocele is always present, and syringomyelia and hydrocephalus are extremely common.

Chiari III malformations include cerebellar herniation into a high cervical myelomeningocele. Chiari IV malformation refers to complete cerebellar agenesis. Both Chiari III and IV malformations are noted at birth and are rarely compatible with life.

Repeat brain and spine imaging in individuals with Chiari I malformations and known syringomyelia or hydromyelia is highly individualized.

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Chiari II Malformations (Arnold Chiari Malformation) (HD-5.2)

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- See **Chiari Malformations (HD-5.1)**

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Chiari III and IV Malformations (HD-5.3)

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- See **Chiari Malformations (HD-5.1)**

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Basilar Impression/Basilar Invagination (HD-5.4)

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Criteria

Medically necessary imaging for suspected or known Basilar Impression or Basilar Invagination:

- MRI Brain without contrast (CPT® 70551) **AND/OR** MRI Cervical Spine without contrast (CPT® 72141)
- If surgery is being considered, CT Head (CPT® 70450) **AND/OR** CT Cervical Spine (CPT® 72125) without contrast are also considered medically necessary **AND/OR** MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** CTA Head (CPT® 70496) **AND/OR** MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR** CTA Neck (CPT® 70498)
  - CTA Head and Neck (CPT® 70471) must be substituted for CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) when performed during the same session.
- One-time screening of first-degree relatives with MRI Brain without contrast (CPT® 70551) is considered medically necessary.

Background and Supporting Information

Basilar impression involves malformation of the occipital bone in relation to C1-2 (cervical vertebrae 1 and 2). The top of the spinal cord is inside the posterior fossa and the foramen magnum is undersized. Over time, this can lead to brain stem and upper spinal cord compression. Basilar impression can also be associated with the Chiari malformation, producing very complex anatomical abnormalities.

Basilar invagination is an abnormality at the craniovertebral junction, either congenital or degenerative, resulting in the odontoid prolapsing into the already limited space of the foramen magnum. It is commonly associated with conditions such as Chiari malformation, syringomyelia, and Klippel-Feil syndrome (Brito et al., 2019).

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Platybasia (HD-5.5)

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Criteria

Medically necessary imaging indications for suspected or known Platybasia:

- MRI Brain without contrast (CPT®70551) or CT Head without contrast (CPT®70450)
- If surgery is being considered,
  - CT Head (CPT®70450) **AND/OR**
  - CT Cervical Spine (CPT®72125) **AND/OR**
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR**
  - CTA Head (CPT® 70496) **AND/OR**
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR**
  - CTA Neck (CPT® 70498)
    - CTA Head and Neck (CPT® 70471) must be substituted when CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed during the same session.

Background and Supporting Information

Platybasia is a flattening malformation of the skull base, in which the clivus has a horizontal orientation.

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Evidence Discussion (HD-5)

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- A CT scan of the head is less sensitive than an MRI of the brain for evaluation of intracranial structures, including major structural abnormalities of the posterior fossa (Expert Panel on Pediatric Imaging et al., 2022a; Expert Panel on Neurologic Imaging et al., 2022b).
- Neuroimaging in the initial evaluation of Chiari malformation should include the spinal cord due to the common occurrence or increased frequency of associated conditions such as cervical syrinx and tethered cord (Strahle et al., 2011a; Strahle et al., 2011b; Strahle et al., 2015a; Strahle et al., 2015b; Dantas et al., 2020; Holly & Batzdorf, 2019).
- For initial evaluation, treatment planning, and follow up, MRI is the preferred modality for malformations of the brain and cervicocranial junction (Smoker & Khanna, 2008; Expert Panel on Pediatric Imaging, 2022; Expert Panel on Neurologic Imaging, 2022; Expert Panel on Pediatric Imaging, 2018). MRI is ideal for evaluating soft tissues, neural structures, and ligaments (Smoker & Khanna, 2008; Pinter 2016).
- As congenital brainstem and cerebellar anomalies are associated with spinal anomalies, MRI of the complete spine is helpful for diagnosis, follow up, and treatment planning (Strahle et al., 2011a;, Strahle et al., 2011b; Strahle et al., 2015a; Strahle et al.,2015b; Expert Panel on Pediatric Imaging et al., 2022).
- A phase-contrast CSF flow study at the craniocervical junction is a supportive study for evaluation of Chiari malformation (Vicotiro & Khoury, 2016; Expert Panel on Pediatric Imaging et al.,2018).
- Evaluation of cervicojunction anomalies, including basilar invagination and platybasia, may require more than one modality for diagnosis and surgical planning (Smoker & Khanna, 2008; Brito et al., 2019; Pinter et al., 2016). CT characterizes osseous anatomy and may be helpful for surgical planning (Smoker & Khanna, 2008; Pinter et al., 2016). MRI is preferred for evaluation of the soft tissues, neural structures, and ligaments for these conditions (Smoker & Khanna, 2008; Pinter et al., 2016). As craniocervical junction anomalies may lead to compression of adjacent vascular structures, CT- or MR-Angiography of the head and neck are useful for surgical planning (Pinter et al., 2016).

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Facial Palsy (Bell's Palsy)/Hemifacial Spasm (HD-6)

Guideline

Facial Palsy (HD-6.1)
Hemifacial Spasm (HD-6.2)
Evidence Discussion (HD-6)
References (HD-6)

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Facial Palsy (HD-6.1)

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Criteria

- MRI Brain without contrast (CPT® 70551) (with attention to posterior fossa and IACs) or MRI Brain without and with contrast (CPT® 70553) (with attention to posterior fossa and IACs) **AND/OR** MRI Orbit/Face/Neck without contrast (CPT® 70540) or MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is/are considered medically necessary when unexplained facial paresis/paralysis is associated with any of the following "red flag" clinical scenarios:
  - Trauma to the temporal bone
  - History of tumor, cancer, HIV, or Lyme disease
  - No improvement in 8 weeks
  - No full recovery in 3 months
  - Gradual onset over weeks to months
  - Vertigo or hearing loss
  - Bilateral involvement
  - Other atypical or inconsistent features including:
    - Second episode of paralysis on the same side
    - Paralysis of isolated branches of the facial nerve
    - Paralysis associated with other cranial nerves
- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for known sarcoidosis with suspected neurosarcoid or CNS involvement is supported, (see also **Autoimmune/ Paraneoplastic Encephalitis & NeuroInflammatory Disorders (HD-14.3)**)
- CT Orbit/Temporal Bone without contrast (CPT® 70480) is considered medically necessary, in the presence of "red flags", to assess osseous integrity of the temporal bone, to characterize fractures, pre-surgical anatomy, inflammatory middle ear disease, bone tumor, facial canal foraminal expansion and/or bone erosion.
- CT Orbit/Temporal Bone with contrast (CPT® 70481) is considered medically necessary, in the presence of "red flags", for suspected tumors and/or infection.
- CT Maxillofacial without contrast (CPT® 70486) is considered medically necessary to assess bony facial nerve canal **OR** with contrast (CPT® 70487) when infection or tumor are suspected, if requested per institutional protocol.
- MRA Head without contrast (CPT® 70544), with contrast (CPT® 70545), or without and with contrast (CPT® 70546) **AND/OR** MRA Neck without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549) **OR** CTA Head (CPT® 70496) **AND/OR** CTA Neck (CPT® 70498) **OR** CTA Head and Neck

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(CPT® 70471) (combination code must be used when both CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed during the same session), is/are considered medically necessary for clinically suspected stroke (see **General Guidelines- CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5)** and **Stroke/TIA (HD-21.1)**).

Background and Supporting Information

Typical features of Bell's palsy include variable initial ipsilateral temporal and auricular pain before facial weakness, onset over 72 hours, ipsilateral complete facial weakness, and an otherwise normal neurological and systemic examination. There is usually slow improvement over several months. Unless "red flags" are present, imaging is not medically necessary.

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Hemifacial Spasm (HD-6.2)

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Criteria

- For hemifacial spasm, facial synkinesis, or blepharospasm, the following are considered medically necessary:
  - MRI Brain without and with contrast (CPT® 70553 OR MRI Brain without contrast (CPT® 70551)
  - Add CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) for consideration of vascular decompression surgical procedure to clarify the vascular anatomy in individuals who have failed conservative medical management
- For tardive dyskinesia, see **Movement Disorders (HD-15.1)**

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Evidence Discussion (HD-6)

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- Facial nerve palsy/Bell's Palsy, commonly referred to as Bell's Palsy, does not routinely require imaging as recommended by the American Academy of Neurology and the American Academy of Otolaryngology Head and Neck Surgery Foundation (Baugh et al., 2013; Expert Panel on Neurological Imaging et al., 2022; Yaltho & Jancovic, 2011; Reich, 2017; Gronseth & Paduga, 2012). Complete recovery typically occurs within 3 to 6 months (Seok et al., 2023).
- When imaging is considered medically necessary, MRI is the preferred modality for evaluating the facial nerve from its origin in the brainstem, through its intracranial and extracranial segments (Expert Panel on Neurological Imaging et al., 2022). This would include imaging of the brain, face or both areas concurrently. (Expert Panel on Neurological Imaging et al. 2022) MRI is useful to exclude structural causes of facial nerve paralysis in the setting of "red flags" (Expert Panel on Neurological Imaging et al., 2022).
- Imaging is reserved for cases with "red flags," which include atypical, recurrent, or persistent cases (Expert Panel on Neurological Imaging et al.,2022; Reich, 2017; Bacorn et al., 2020; Seok et al., 2023). Limiting imaging to those with "red flags" avoids unnecessary radiation exposure, identification of incidental findings, contrast reactions, and unnecessary costs. (Baugh 2013,Induruwa 2019) The risk of limiting imaging includes missing identifiable and treatable causes of facial paralysis. To mitigate this risk, clinical follow up is recommended at 3 months (Baugh et al., 2013).
- MRI has sensitivity ranging from 73% to 100% in detecting peripheral spread of tumor (Expert Panel on Neurological Imaging et al., 2022).
- As the facial nerve courses through the temporal bone, CT temporal bone is useful to identify temporal bone fractures, bony anatomy, bone erosion and for surgical planning (Expert Panel on Neurological Imaging et al., 2022).
- Vascular imaging is helpful if stroke is clinically suspected (Expert Panel on Neurological Imaging et al., 2022).
- For evaluation of hemifacial spasm, MRA allows characterization of vascular loops compressing the facial nerve, with sensitivity >95% and correlates well with surgical findings (Expert Panel on Neurological Imaging et al., 2022; Yaltho & Jankovic, 2011).

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Recurrent Laryngeal Palsy/Vocal Cord Palsy (HD-7)

Guideline

Recurrent Laryngeal Palsy/Vocal Cord Palsy (HD-7.1)

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Recurrent Laryngeal Palsy/Vocal Cord Palsy (HD-7.1)

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- See **Recurrent Laryngeal Nerve Palsy in Neck-7.1**

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Mild Cognitive Impairment (MCI) and Dementia (HD-8)

Guideline

Mild Cognitive Impairment (MCI) and Dementia - MRI/CT (HD-8.1)
Mild Cognitive Impairment (MCI) and Dementia - PET (HD-8.2)
Lewy Body Dementia (LBD) - SPECT and PET (HD-8.3)
Normal Pressure Hydrocephalus (NPH) (HD-8.4)
Imaging Related to Alzheimer's Treatment with Amyloid Reduction Medications (HD-8.5)
References (HD-8)

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Mild Cognitive Impairment (MCI) and Dementia - MRI/CT (HD-8.1)

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Mild Cognitive Impairment (MCI) Evaluation

Dementia Evaluation

Imaging Related to Alzheimer's Treatment with Amyloid Reduction Medications

Background and Supporting Information

Evidence Discussion (HD-8.1)

Criteria

- For subjective cognitive decline with normal cognitive testing, advanced imaging is considered not medically necessary.

Mild Cognitive Impairment (MCI) Evaluation

Criteria

For the evaluation of memory loss and/or cognitive impairment due to suspected Mild Cognitive Impairment (MCI) when treatment with amyloid reducing medications is not documented.

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) or CT Head without contrast (CPT® 70450) is considered medically necessary when **ALL** the following criteria are met:
  - a detailed history of cognitive decline with impairments confirmed by family members or others with knowledge of the individual's status

    OR
  - abnormal mental status test score or neuropsychological test results consistent with mild cognitive impairment/mild neurocognitive disorder
    - Examples of abnormal mental status test results consistent with MCI include neuropsychological testing demonstrating a decline in cognitive function and/or the following test scores:
      - Montreal Cognitive Assessment (MOCA) not less than 17,
      - Saint Louis University Mental Status (SLUMS) not less than 20, or

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- Mini Mental State Exam (MMSE) not less than 20

Dementia Evaluation

Criteria

For the evaluation of memory loss and/or cognitive impairment due to suspected dementia when treatment with amyloid reducing medications is not documented.

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) or CT Head without contrast (CPT® 70450) is considered medically necessary when **ALL** the following criteria are met:
  - a detailed history and neurologic exam including mental status testing should be performed prior to advanced imaging
  - date of onset of symptoms with documentation of six (6) months of cognitive decline
  - documentation of a decline in cognitive function obtained with **either**:
    - a detailed history of memory loss with impairment of day-to-day activities confirmed by family members or others with knowledge of the individual's status

      OR
    - abnormal mental status test score consistent with dementia or neuropsychological test results consistent with dementia/major neurocognitive disorder
      - examples of abnormal bedside mental status testing scores include:
        - Mini-Mental State Exam (MMSE) less than 26,
        - Montreal Cognitive Assessment (MoCA) less than 26,
        - Memory Impairment Screen (MIS) less than 5,
        - St. Louis University Mental Status (SLUMS) less than 21, or
        - Eight-item Informant Interview to Differentiate Aging and Dementia (AD8) Dementia Score greater than 2
  - Presumptive causes of dementia have been excluded
    - cannot occur exclusively during bouts of delirium
    - cannot be explained by another mental disorder

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Imaging Related to Alzheimer's Treatment with Amyloid Reduction Medications

Criteria

For MRI brain and/or CT head imaging related to Alzheimer's treatment with amyloid reduction medications see **Imaging Related to Treatment with Amyloid Reduction Medications (HD-8.5)**

- Quantitative Magnetic Resonance Image (MRI) Analysis of the Brain
  - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be ordered as (CPT® 0865T or CPT® 0866T).
    - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered not medically necessary in the evaluation of dementia.
  - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be ordered as 3D rendering (CPT® 76376 and CPT® 76377).
    - These studies lack sufficient specificity and sensitivity to be clinically useful in the evaluation or follow up of individuals with dementia. Their use is limited to research studies and are otherwise to be considered not medically necessary in routine clinical practice.
- AI-powered connectomic analysis of the brain CPT® 0319T
  - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.
- For amyloid PET requests in the treatment with amyloid reducing medications, see **Mild Cognitive Impairment (MCI) and Dementia – PET (HD-8.2)**
- For acute mental status change, see **Mental Status Change (HD-4.2)** and/or **Stroke/ TIA (HD-21.1)**
- For evaluation of Lewy Body Dementia, see **Lewy Body Dementia (LBD) – SPECT and PET (HD-8.3)**
- For the evaluation of Normal Pressure Hydrocephalus, see **Normal Pressure Hydrocephalus (HD-8.4)**
- For evaluation of rapidly progressive memory loss see **Autoimmune/Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD-14.3)**
- For evaluation of suspected vascular dementia see **Cerebrovascular Disease (HD-21.1)**

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Background and Supporting Information

Subjective cognitive decline (SCD) refers to individuals who are concerned about a cognitive decline but perform normally on cognitive testing.

Mild Cognitive Impairment (MCI), also referred to as mild neurocognitive disorder, is marked by focal or multifocal cognitive impairment with minimal impairment of instrumental activities of daily living that do not cross the threshold for dementia.

Cognitive domains affected by MCI may include memory, attention, language, visuospatial processing, executive function, and social behavior. Examples of memory loss include forgetfulness, repeating questions, forgetting recent events or conversations. Attention deficits may include periods of decreased alertness or distractibility. Language impairment may be displayed as word finding difficulties, difficulty communicating and/or understanding. Visuospatial processing impairment may present as getting lost. Executive dysfunction including difficulty completing multi-step commands, planning, or using appliances. Concerning social behaviors include impulsiveness and inappropriate behaviors.

The functional impact of cognitive symptoms should be evaluated. Individuals with mild cognitive impairment may have difficulties completing instrumental activities of daily living such as managing finances, cooking, medications, and using transportation.

On neuropsychological testing, individuals with mild neurocognitive disorder perform at least 1 standard deviation below appropriate norms. Of note, a highly educated individual who scores within the normal range on screening tests, for example, a score of 29/30 on the MMSE, may show objective deficits in cognitive function on formal neuropsychological testing, consistent with a diagnosis of MCI.

Dementia, or major neurocognitive disorder, as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), refers to significant cognitive decline, with impairment in cognitive performance in domains including complex attention, executive function, learning and memory, language, perceptual-motor skills, or social cognition.

On neuropsychological testing, individuals with a major neurocognitive disorder perform 2 or more standard deviations below appropriate norms.

Impairment in activities of daily living include bathing, dressing, grooming, feeding and toileting.

Presumptive causes of cognitive decline include metabolic abnormalities such as hypothyroidism, uncontrolled diabetes, vitamin deficiencies, and/or untreated disorders such as sleep apnea.

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Evidence Discussion (HD-8.1)

- The primary role of neuroimaging in the work up of individuals diagnosed with mild cognitive impairment or dementia is to exclude other serious differential diagnosis such as tumors, subdural hematomas, and normal pressure hydrocephalus (Soderlund et al., 2024; Knopman et al., 2001). The American Academy of Neurology (AAN) recommended the use of non-contrast CT or Brain MRI for aiding in the diagnosis of dementia (Knopman et al., 2001; McCollum & Karlawish, 2020). Cross-sectional imaging may also identify characteristic brain atrophy patterns found in common neurodegenerative diseases and vascular insults (Soderlund et al., 2024). CT imaging may also be used when MRI scans are contraindicated.
- Volumetric MRI Brain for the diagnosis of dementia is not currently recommended for routine clinical use by the AAN (Knopman et al.,2001; McCollum & Karlawish, 2020). There remains a significant evidence gap in the literature regarding clinical validation of volumetric MRI in the diagnosis of dementia. Their use remains limited to research studies (McCollum & Karlawish,2020, Pemberton et al.,2021).

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Mild Cognitive Impairment (MCI) and Dementia - PET (HD-8.2)

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Brain PET CPT® Codes	Definition
78608	Used to report FDG PET metabolic brain studies for dementia, seizure disorders, and brain tumors
78609	Used to report PET brain perfusion studies, primarily used for brain tumors
78811	Limited PET, used for amyloid or tau PET, static imaging to measure amyloid and tau
78814	Limited PET/CT, used for amyloid or tau PET, static images to measure amyloid or tau

Metabolic (FDG) PET Brain CPT® 78608

Amyloid PET Brain CPT® 78814 or 78811

Tau PET Brain CPT® 78814 or 78811

Perfusion PET Brain CPT® 78609

Background and Supporting Information

Evidence Discussion

Metabolic (FDG) PET Brain (CPT® 78608)

Criteria

Mild Cognitive Impairment

- Metabolic (FDG) PET (CPT® 78608) is considered medically necessary in the evaluation of for Mild Cognitive Impairment (MCI) when Alzheimer's Disease is suspected and **ALL** the following criteria are met:

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- established diagnosis of mild cognitive impairment based on clinical history, physical examination, and cognitive testing, which may include neuropsychological testing.
- documentation of cognitive decline obtained by either:
  - detailed history of cognitive decline with impairments confirmed by family members or others with knowledge of the individuals status

    OR
  - abnormal mental status test score or neuropsychological test results consistent with mild cognitive impairment/mild neurocognitive disorder
    - examples of abnormal mental status test results consistent with MCI include:
      - Montreal Cognitive Assessment (MOCA) score not less than 17
      - Saint Louis University Mental Status (SLUMS) score not less than 20
      - Mini Mental State Exam (MMSE) score not less than 20
- results of any structural brain imaging (MRI Brain or CT Head) previously performed.

Dementia

- Metabolic (FDG) PET Brain (CPT® 78608) is considered medically necessary in the evaluation of dementia to distinguish between Alzheimer's disease (AD) and Frontotemporal Dementia (FTD) or for suspected Alzheimer disease with atypical clinical presentation when all the following criteria are met (Soderlund, 2025) :
  - Suspected diagnosis of dementia:
    - date of onset of symptoms with documentation of 6 months of cognitive decline
    - documentation of a decline in cognitive function obtained with either:
      - a detailed history of memory loss with impairment of day-to-day activities confirmed by family members or others with knowledge of the individual's status

        OR
      - abnormal mental status testing score consistent with dementia
        - examples of abnormal bedside mental status testing scores include:
          - Mini-Mental State Exam (MMSE) less than 26,
          - Montreal Cognitive Assessment Survey (MoCA) less than 26,
          - Memory Impairment Screen (MIS) less than 5,
          - St. Louis University Mental Status (SLUMS) less than 21, or
          - Eight-item Informant Interview to Differentiate Aging and Dementia (AD8) Dementia Score greater than 2
  - results of any structural imaging (MRI Brain or CT Head) previously performed
  - meets diagnostic criteria for AD and FTD

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- the results are expected to clarify the diagnosis between FTD and AD and help guide future treatment
- cause of clinical symptoms is uncertain
- evaluation has ruled out specific alternative neurodegenerative disease or causative factors
  - cannot occur exclusively during bouts of delirium
  - cannot be explained by another mental disorder
- Metabolic FDG-PET brain (CPT® 78608) is otherwise considered not medically necessary for the purpose of diagnosis and management of other forms of dementia including, but not limited to, Parkinson's disease, normal pressure hydrocephalus, and chronic traumatic encephalopathy.
  - For requests related to Lewy Body Dementia, see **Lewy Body Dementia (LBD) – SPECT and PET (HD-8.3)**
- Metabolic FDG-PET(CPT® 78608)/MRI Brain without contrast (CPT® 70551) OR MRI Brain without and with contrast (CPT® 70553) imaging may be considered on a case-by-case basis for those imaging centers that will utilize FDG-PET/MRI during an initial evaluation (instead of MRI alone) and who also have a standardization of imaging protocol.

Amyloid PET Brain (CPT® 78814 or 78811)

Criteria

- Amyloid Brain PET is considered medically necessary when a diagnosis of MCI or dementia due to Alzheimer's disease is suspected based on cognitive testing, and evaluation including structural brain imaging has been completed, in ANY of the following clinical scenarios:
  - individuals with MCI or dementia who are under 65 years of age and in whom AD is suspected
  - individuals with MCI or dementia that could be consistent with amnestic AD pathology with onset at 65 years of age or older
  - individuals with MCI or dementia that could be consistent with AD but has atypical clinical features
  - individuals with MCI or dementia with equivocal or inconclusive results on CSF biomarkers
  - to inform the prognosis of individuals with MCI due to suspected AD pathology
  -

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Imaging Related to Alzheimer's Treatment with Amyloid Reduction Medications

For Cerebral Amyloid Angiopathy, see **Stroke/TIA (HD-21.1)**

For Amyloid PET imaging related to Alzheimer's treatment with amyloid reduction medications see **Imaging Related to Alzheimer's Treatment with Amyloid Reduction Medications (HD-8.5)**

Tau PET Brain (CPT® 78814 or 78811)

Criteria

- Tau PET is considered medically necessary for evaluation of cognitive impairment in individuals with suspected AD with atypical clinical presentation when all the following criteria are met:
  - established diagnosis of mild cognitive impairment or dementia
  - evaluation has excluded other causes
  - results of structural brain imaging are available to the ordering provider

Perfusion PET Brain (CPT® 78609)

Critiera

Perfusion PET Brain imaging (CPT® 78609) is considered not medically necessary in the evaluation of dementia.

Background and Supporting Information

An atypical clinical presentation of Alzheimer's Disease (AD) is one that meets core clinical criteria of cognitive impairment in multiple domains, which interfere with instrumental activities of daily living and functioning, but has sudden or rapid onset or the onset occurs at a younger age (under 65).

Atypical AD variants include:

- Early-onset
- Amnestic variant early-onset AD
- Visuospatial variant AD (posterior cortical atrophy [PCA])
- Language variant AD (lopogenic variant primary progressive aphasia [PPA])
- Behavioral variant/dysexecutive variant AD
- Motor variant AD corticobasal syndrome due to AD

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Atypical clinical presentation of AD is estimated to occur in up to 25% of patients and presents with nonamnestic syndromes, including language dysfunction, visuospatial impairments, executive dysfunction, changes in personality, behavior and motor function.

Autopsy studies show that AD is the most common underlying neuropathology in logopenic variant PPA and PCA syndromes. AD is the underlying pathology in 25% of those with corticobasal syndrome and is also associated with primary dysexecutive syndrome.

Corticobasal degeneration presents with asymmetric rigidity, limb apraxia, postural instability, myoclonus, alien limb, and cortical sensory loss.

Posterior Cortical Atrophy (PCA) affects visual processing pathways and presents with progressive visual impairment.

The frontotemporal dementias (FTDs) are a group of neurodegenerative disorders that differ from Alzheimer's disease. The basic pathology involves accumulation of tau proteins in the brain rather than amyloid. Onset tends to be younger (less than 65) and progression usually more rapid than in senile dementia-Alzheimer type (SDAT). There is no treatment, and the medications used to help memory in Alzheimer's disease are not effective.

There are several subtypes of FTD; most common are the behavioral variant with early loss of executive functions, impaired judgment disinhibition and impulsivity, and the semantic variant with primary and progressive loss of language ability (primary progressive aphasia type FTD). Other less common subtypes include progressive supranuclear palsy, corticobasal syndrome, and FTD associated with motor neuron disease.

Diagnosis of FTD is based on clinical features, neuropsychological testing, and brain imaging (preferably MRI) to rule out other structural disease. Metabolic (FDG) PET Brain is helpful by demonstrating patterns of abnormality more consistent with FTD than Alzheimer's disease.

Recent research has examined the utility of PET/MRI for evaluation of individuals with dementia. Due to the prolonged acquisition time, motion during a PET may lead to artifacts such as blurring of the images. Use of co-registration of PET with MRI can lead to better PET assessment especially with quantitative measurements. Utilization of PET/MRI provides greater confidence in imaging reading by permitting greater structural correlation. A recent study compared FDG-PET/CT and FDG-PET/MRI in a memory disorders clinic. This study identified more individuals with cerebrovascular disease (stroke) and better cortical atrophy characterization. The authors found that PET/MRI provided significant improvement in diagnosis and management of individuals in which dementia is a consideration.

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Evidence Discussion (HD-8.2)

The Alzheimer's Association workgroup has revised the criteria for diagnosis and staging of Alzheimer's Disease (AD) (Jack et al., 2024). The workgroup defined Alzheimer's disease as a biological process, rather than a clinical syndrome, which allows diagnosis in the asymptomatic phase, based on positive biomarkers (Core 1 biomarkers) (Jack et al., 2024). These Core 1 biomarkers include Amyloid PET and cerebrospinal fluid biomarkers (Jack et al., 2024) An abnormal Core 1 biomarker is sufficient to establish a diagnosis of AD (Soderlund et al., 2024; Jack et al., 2024).

Structural, functional, and molecular brain imaging in individuals with MCI helps to identify potentially treatable structural abnormalities and identify imaging features that may confer an increased risk of transformation to a dementia (Soderlund et al., 2024). In addition, molecular imaging helps inform prognosis, for patients and their families, and allows early treatment initiation (Soderlund et al., 2024; Rabinovici et al., 2025).

Amyloid PET is positive in 60% of individuals with MCI (Soderlund et al., 2024). Greater cognitive decline is noted in those with MCI and a positive amyloid PET scan, and they are more likely to progress to AD than those with a negative amyloid PET (Soderlund et al.,2024; Rabinovici et al., 2025). Amyloid PET also results in a change in diagnosis in up to 44% of individuals, therefore increasing diagnostic confidence (Soderlund et al., 2024).

Amyloid PET has a pooled sensitivity of 0.90 and specificity of 0.80 for diagnosis of AD, and a pooled sensitivity of 0.84 and specificity of 0.62 for predicting conversion of MCI to dementia (Ruan & Sun, 2023).

Molecular brain imaging is particularly helpful in confirming a diagnosis of AD with atypical clinical presentation (Soderlund et al.,2024). A positive amyloid PET in early-onset or atypical AD can lead to a change in diagnosis of 66.8%, improve confidence in diagnosis in 81.5% and change management in 80% of cases (Soderlund et al., 2024; Ceccaldi et al., 2018). The use of amyloid PET led to changes in management in 63.5% of Medicare members with dementia (Rabinovicci et al., 2025, Rabinivicci et al., 2019).

The Society of Nuclear Medicine Imaging and Molecular Imaging released Appropriate Use Criteria (AUC) for amyloid PET which included the following clinical scenarios (Soderlund et al., 2024; Rabinovici et al., 2025):

- Individuals with MCI or dementia who are under 65 years of age and for whom AD is suspected
- Individuals with MCI or dementia consistent with amnestic AD pathology with onset ≥65 years of age
- Individuals with MCI or dementia that could be consistent with AD but has atypical features

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- Individuals with MCI or dementia with equivocal or inconclusive results on CSF biomarkers
- To inform the prognosis of patients due to suspected AD pathology
- To determine eligibility for treatment with amyloid-targeting therapy and to monitor treatment response

Tau PET is considered appropriate for the evaluation of individuals presenting with MCI or a dementia syndrome that could be consistent with AD pathology but has atypical features (Soderlund et al., 2024; Rabinovici et al., 2025). In these clinical scenarios, tau uptake correlates with cognitive function and is helpful to diagnose atypical clinical phenotypes of AD (Soderlund et al., 2024).

The work groups supports tau PET in atypical cases as a tau binding pattern can help establish AD as the cause of impairment and the spatial pattern of tau uptake matches brain regions clinically affected (Rabinovici et al., 2025). Furthermore, a high tau burden is associated with more rapid clinical progression (Rabinovici et al. 2025).

FDG-PET Brain in the evaluation of MCI shows a pattern of hypometabolism consistent with AD in up to 79% of cases (Soderlund et al., 2024). In addition, an abnormal pattern predicts conversion from MCI to AD with an accuracy over 80% (Soderlund et al., 2024). Conversely, a negative FDG PET reduces the likelihood of progression to dementia (Soderlund et al., 2024).

FDG-PET brain accurately discriminates Alzheimer's disease individuals from normal subjects with a sensitivity of 96% and specificity of 100% (Soderlund et al., 2024).

Metabolic (FDG) PET brain is helpful by demonstrating patterns of abnormality more consistent with FTD than Alzheimer's disease. FDG PET brain has a sensitivity of 86% and specificity of 97.6% in evaluating individuals with FTD (Soderlund et al., 2024). The use of FDG PET increases diagnostic accuracy and confidence for both AD and FTD (Soderlund et al., 2024). It is particularly helpful in cases of diagnostic uncertainty (Soderlund et al., 2024).

Recent research has examined the utility of PET/MRI for evaluation of individuals with dementia. Due to the prolonged acquisition time, motion during a PET may lead to artifacts such as blurring of the images. Use of co-registration of PET with MRI can lead to better PET assessment especially with quantitative measurements.(Chen 2018, Patel 2020) Utilization of PET/MRI provides greater confidence in reading images by permitting greater structural correlation. A recent study compared FDG-PET/CT and FDG-PET/MRI in a memory disorders clinic (Kaltoft et al., 2019). The main findings were that FDG PET/MRI revealed more vascular pathology in 35% of individuals, induced a change of the interpretation of FDG PET in 17% of individuals and was considered to influence management in 22% of individuals (Kaltoft et al., 2019).

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Lewy Body Dementia (LBD) - SPECT and PET (HD-8.3)

HD.DM.0008.3.A
v1.0.2027

SPECT Brain Scan

Metabolic (FDG) PET Brain

Background and Supporting Information

Evidence Discussion (HD-8.3)

SPECT Brain Scan

Criteria

- SPECT Brain Scan (CPT® 78803 or CPT® 78830) is considered medically necessary for evaluation of suspected Lewy Body Dementia when **ALL** of the following are met:
  - Established diagnosis of dementia:
    - date of onset of symptoms with documentation of 6 months of cognitive decline
    - documentation of decline in cognitive function obtained with either:
      - a detailed history of memory loss with impairment of day-to-day activities confirmed by family members or others with knowledge of the individual's status

        OR
      - abnormal mental status test score consistent with dementia or neuropsychological test results consistent with dementia/major neurocognitive disorder
        - examples of abnormal bedside mental status testing scores include:
          - Mini-Mental State Exam (MMSE) <26,
          - Montreal Cognitive Assessment Survey (MoCA) <26,
          - Memory Impairment Screen (MIS) <5,
          - St. Louis University Mental Status (SLUMS) <21, or
          - Eight-item Informant Interview to Differentiate Aging and Dementia (AD8) Dementia >2
  - Presumptive causes of dementia have been excluded
    - cannot occur exclusively during bouts of delirium

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        - cannot be explained by another mental disorder
    - Results of any structural brain imaging (MRI or CT Head)

Metabolic (FDG) PET Brain

Criteria

- Metabolic (FDG) PET brain (CPT® 78608) is considered medically necessary to differentiate Lewy Body Dementia (LBD) from Alzheimer's Disease (AD) when all the following criteria are met:
    - Established diagnosis of dementia:
        - Date of onset of symptoms with documentation of 6 months of cognitive decline
        - Documentation of decline in cognitive function obtained with either:
            - a detailed history of memory loss with impairment of day-to-day activities confirmed by family members or others with knowledge of the individual's status

              OR
            - abnormal mental status test score consistent with dementia or neuropsychological test results consistent with dementia/major neurocognitive disorder
                - Examples of abnormal bedside mental status testing scores include:
                    - Mini-Mental State Exam (MMSE)<26,
                    - Montreal Cognitive Assessment Survey (MoCA) <26,
                    - Memory Impairment Screen (MIS) <5,
                    - St. Louis University Mental Status (SLUMS) <21, or
                    - Eight- item Informant Interview to Differentiate Aging and Dementia (AD8) Dementia Score >2
    - Presumptive causes of dementia have been excluded
        - Cannot occur exclusively during bouts of delirium
        - Cannot be explained by another mental disorder
    - Results of any structural imaging (MRI or CT Head) performed

Background and Supporting Information

- Dementia with Lewy bodies is often hard to diagnose because its early symptoms may resemble those of Alzheimer's or a psychiatric illness. Over time people with LBD often develop similar symptoms due to the presence of Lewy bodies in the brain.

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  - Clinicians and researchers may use the "1-year rule" to help make a diagnosis. If cognitive, psychiatric, emotional, and/or personality symptoms appear at the same time as or at least a year before movement problems/Parkinsonism, the diagnosis is dementia with Lewy bodies. If cognitive problems develop more than a year after the onset of movement problems, Parkinson's disease, the diagnosis is Parkinson's disease dementia (PDD).
- Core Clinical Symptoms
  - Dementia
  - Movement problems/Parkinsonism
  - Cognitive fluctuations
  - Visual hallucinations
  - REM sleep behavior disorder
- Supportive Clinical Symptoms
  - Extreme sensitivity to antipsychotic medications
  - Falls, fainting
  - Severe problems with involuntary functions (maintaining blood pressure, incontinence, constipation, loss of smell)
  - Changes in personality and mood (depression, apathy, anxiety)

Test Results Supporting Diagnosis

- Abnormal ^{123}iodine-MIBG myocardial scintigraphy showing reduced communication of cardiac nerves
- Sleep study confirming REM sleep behavior disorder without loss of muscle tone

Evidence Discussion (HD-8.3)

- For suspected Lewy Body Dementia (LBD), a CT or MRI head is appropriate as the initial imaging study (McCleery et al., 2015; McCollum & Karlawish, 2020).
- To increase diagnostic accuracy of LBD, SPECT modalities are helpful for differentiating LBD from Alzheimer's dementia (Soderlund et al., 2024; Subramaniam et al., 2017; McCleery et al., 2015; Armstrong, 2019).
- Functional imaging of the dopamine transporter (DAT) (Iodine-123 Ioflupane) using SPECT shows a deficiency in the nigrostriatal pathway in LBD. This is considered a second line imaging test after cross-sectional imaging has excluded other pathology, such as vascular lesions along the nigrostriatal pathway, which can lead to abnormal DAT images with false positive results (McCleery et al., 2015).
- An abnormal DAT-SPECT scan has a sensitivity of 78.7% and a specificity of 90.4% for probable LBD (Soderlund et al., 2024; McCleery et al., 2015)

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- Metabolic (FDG) PET imaging demonstrates features which would support a diagnosis of LBD. Hypometabolism in the occipital lobe differentiates LBD from AD (Soderlund et al., 2024; Oldan et al., 2021). In addition, the "cingulate island sign", which refers to the preservation of FDG metabolism in the posterior cingulate gyrus, is considered a biomarker for LBD (Soderlund et al., 2024; Feng et al., 2023)

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Normal Pressure Hydrocephalus (NPH) (HD-8.4)

HD.DM.0008.4.A
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Criteria

- CT Head without contrast (CPT® 70450) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary if the individual has at least two symptoms involving gait abnormality (see *Background and Supporting Information*), urinary incontinence, or dementia **AND**
  - The clinical symptoms cannot be completely explained by other neurological or non-neurological disease, **AND**
  - There is no apparent preceding disorder that would cause hydrocephalus
- The components of Dementia are delineated in **Mild Cognitive Impairment (MCI) and Dementia – MRI/CT (HD-8.1)**, but include:
  - Results of testing and/or neuropsychological testing can be performed when history and mental status examination cannot provide a confident diagnosis.
  - Examples of abnormal mental status testing such as Mini-Mental State Exam (MMSE) with score under 26, Montreal Cognitive Assessment Survey (MoCA) with score under 26, Memory Impairment Screen (MIS) with score <5, the St. Louis University Mental Status (SLUMS) with score under 21, or the Eight-item Informant Interview to Differentiate Aging and Dementia (AD8) Dementia Score greater than 2.
  - Presumptive causes or etiology/ies of dementia
    - Cannot occur exclusively during bouts of delirium
    - Cannot be explained by another mental disorder
- MRI Brain (CPT® 70551, CPT® 70552, or CPT® 70553) is considered not medically necessary for the diagnosis of NPH if a CT has been performed. However, MRI Brain is considered medically necessary if needed for pre-surgical planning.
  - After neuro imaging, the next steps are CSF sampling, drainage, and dynamics.
- Follow-up imaging for individuals diagnosed with NPH with a shunt should follow **Hydrocephalus Shunts (HD-11.14)**, **Low-Pressure Headache and CSF Leak (HD-11.15)**, or **Nuclear Medicine (HD-36.1)**

Background and Supporting Information

Normal Pressure Hydrocephalus (NPH) is seen typically in the elderly. It comprises a triad of symptoms: cognitive dysfunction, incontinence of urine, and gait disturbance (typically a “magnetic”, small-step, shuffling, or broad-based gait). The reported

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neuroradiologic marker for this is ventriculomegaly (enlarged ventricles) in the brain. Unfortunately, these symptoms and this neuroradiologic finding is common in the elderly, making the diagnosis of NPH in any given individual problematic. It is radiographically common and clinically rare.

Evidence Discussion (HD-8.4)

- Initial neuroimaging for the evaluation of suspected Normal Pressure Hydrocephalus (NPH) includes CT Head or MRI Brain in individuals with clinical symptoms and no explanation for hydrocephalus (Soderlund et al., 2024; Capone et al., 2020).
- Only a single modality study is considered medically necessary. The initial best modality is MRI Brain because of its higher intrinsic soft tissue resolution and because it can often be used as a pre-surgical exam (Soderlund et al., 202; Capone et al., 2020).
- By using the appropriate single best test, we avoid duplicate imaging and unnecessary radiation to the lens of the eye and other head and neck structures (Soderlund et al., 2024).
- Cine MRI showing hyperdynamic aqueductal CSF flow can also help in identifying shunt-responsive NPH individuals. The benefit of this exam is that it offers us functional information about CSF flow and can help improve individual outcomes (Soderlund et al., 2024; Capone et al., 2020; Bradley, 2015).

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Imaging Related to Alzheimer's Treatment with Amyloid Reduction Medications (HD-8.5)

HD.DM.0008.5.A
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Criteria

MRI Brain and Amyloid Brain PET are medically necessary to determine eligibility for the treatment of Alzheimer's disease with monoclonal antibodies directed against amyloid (e.g., Donanemab [Kisunla®] and Lecanemab [Leqembi®]) when the following criteria are met:

- Diagnosis of mild cognitive impairment (MCI) or mild dementia due to Alzheimer's disease
- Requested by a neurologist, geriatric psychiatrist or geriatrician
- Change in memory/cognitive function has been present for at least six (6) months
- Baseline MRI brain results are available to the ordering provider
- No intracerebral hemorrhage or vasogenic edema on MRI.
- A bedside cognitive exam score has been obtained and is consistent with MCI or mild AD (i.e., MMSE not < 20, MoCA not < 17, SLUMS not < 20).

ANY of the following imaging studies are medically necessary related to the use of monoclonal antibodies, including Lecanemab (Leqembi®) and Donanemab (Kisunla®), during treatment and to monitor treatment response:

- CT Head without contrast (CPT® 70450)
- MRI Brain without and with contrast (CPT® 70553), MRI Brain without contrast (CPT® 70551), MRI Brain with contrast (CPT® 70552)

Follow-up imaging during treatment, no more often than once every six (6) months:

- Amyloid Brain PET (CPT® 78811 [limited PET] or CPT® 78814 [limited PET/CT])

Background and Supporting Information

Amyloid reduction medications are considered medically necessary for the treatment of Mild Cognitive Impairment (MCI) due to Alzheimer's disease and mild, early- stage Alzheimer's disease.(Patel et al. 2020)

These medications are monoclonal antibodies that selectively bind to aggregated forms of beta amyloid. The accumulation of amyloid plaques in the brain is a defining

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pathophysiologic feature of Alzheimer's disease. In clinical trials, these medications reduce amyloid beta plaque compared with placebo.(Patel et al. 2020)

Amyloid-related imaging abnormalities (ARIA) have been caused by these medications. ARIA usually occurs early in treatment and may be asymptomatic although serious and life-threatening events may occur. Screening MRI Brain prior to treatment initiation and periodic monitoring during treatment is recommended. For moderate to severe ARIA, treatment may be suspended. Once ARIA is identified on a brain MRI, follow up MRIs are considered medically necessary to assess for radiographic resolution and/or symptom resolution with the imaging time frame determined by the treating physician. Resumption of dosing is guided by clinical judgment.(Patel et al. 2020)

ARIA may be further characterized as ARIA with edema (ARIA-E) or ARIA with hemosiderin (ARIA-H). ARIA-E presents on MRI as brain edema or sulcal effusions. ARIA-H includes microhemorrhage and superficial siderosis. ARIA-E and ARIA-H may occur simultaneously.(Patel et al. 2020)

Although ARIA is usually asymptomatic, symptoms associated with ARIA include headache, confusion, visual changes, dizziness, nausea, aphasia, weakness, gait difficulty and seizures, including status epilepticus. Focal neurologic deficits may also occur.(Patel et al.2020) The risk of ARIA is increased in apolipoprotein E ε4 (ApoE ε4) homozygotes.(Patel et al. 2020)

Leqembi® dosing after 18 months may be administered every 2 weeks or transitioned to a maintenance regimen every 4 weeks.

Transitioning from one amyloid targeting monoclonal antibody to another should be done when the individual has been off of the prior drug for 5 half-lives prior to initiation of the alternative drug. The half-life of aducanumab is 24.3 days; the half-life of lecanemab is 9.5 days, and the half-life of donanemab is 11.8 days. Individuals should be off of aducanumab for approximately 4 months or off lecanemab or donanemab for approximately 6 weeks prior to initiation of a different amyloid targeting monoclonal antibody.

Evidence Discussion (HD-8.5)

- Structural brain imaging in the work up of individuals diagnosed with dementia is primarily to exclude other significant intracranial abnormalities. A brain MRI will assist with the diagnosis of dementia by excluding structural pathology such as tumors or subdural hematomas (Soderlund et al., 2024).
- Amyloid-related imaging abnormalities (ARIA) have been associated with treatment by amyloid reduction medications. ARIA usually occurs early in treatment and may be asymptomatic although serious and life-threatening events may occur. Screening brain MRI prior to treatment initiation and periodic monitoring during treatment is recommended (Eli Lily 2024; Eisai Inc. and Biogen, 2025). For moderate to severe ARIA, treatment may be suspended. Once ARIA is identified on a brain MRI, follow-

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up MRIs are medically necessary to assess for radiographic resolution and/or symptom resolution with the imaging time-frame determined by the treating physician (Eli Lily 2024; Eisai Inc. and Biogen, 2025). Resumption of dosing is guided by clinical judgment (Eli Lily 2024; Eisai Inc. and Biogen, 2025).

- Amyloid PET brain is a form of molecular imaging, which uses a tracer that binds to amyloid plaques in the brain. At the present time, the use of Amyloid PET brain is limited to confirming the presence of amyloid in the brain, in those with mild cognitive impairment due to Alzheimer's disease or mild dementia due to Alzheimer's disease, prior to treatment with amyloid reducing medications.

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Epilepsy/Seizures (HD-9)

Guideline

Epilepsy/Seizures (HD-9.1)
Perioperative Evaluations for Drug-Resistant Epilepsy (HD-9.2)
References (HD-9)

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Epilepsy/Seizures (HD-9.1)

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Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for:
  - evaluation of new onset seizures
  - refractory or drug-resistant seizures
  - new neurologic deficit or no return to previous neurologic baseline
  - change in the type of seizure
  - additional evaluation, if CT Head was performed for an initial evaluation for new onset seizure, MRI (as described above) is considered medically necessary for additional evaluation
  - follow-up, MRI Brain with “Epilepsy Protocol” is considered medically necessary
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **OR** CT Head without contrast (CPT® 70450) is considered medically necessary for:
  - repeat imaging at the discretion of the neurologist or neurosurgeon, or any provider in consultation with a neurologist or neurosurgeon.
- CT Head without contrast (CPT® 70450) is considered medically necessary for:
  - evaluation of structural findings in seizure etiologies that contain dystrophic calcifications, such as with oligodendrogliomas and tuberous sclerosis
  - acute setting of seizure evaluation
- CT Head (contrast as requested) (CPT®70450, CPT®70460, **OR** CPT®70470) is considered medically necessary when:
  - MRI is contraindicated
  - request is urgent
- For seizure and/or altered mental status associated with head trauma, see **Head Trauma (HD-13.1)**
- 3D T1 and/or FLAIR sequences are useful in improving lesion detection for the diagnosis and monitoring of epilepsy. 3D T1 and FLAIR sequences do not require an additional CPT® for 3D rendering (CPT® 76376 and CPT® 76377).
- Quantitative Magnetic Resonance Image (MRI) Analysis of the Brain
  - Quantitative Magnetic Resonance Image (MRI) Analysis of the Brain Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be requested as (CPT® 0865T or CPT® 0866T)

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        - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered not medically necessary in the evaluation of epilepsy.
- AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T
    - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.

Evidence Discussion (HD-9.1)

- The use of advanced imaging is considered medically necessary for the initial evaluation of adults with seizure. Unenhanced CT is more readily available so is usually the initial imaging examination performed for adults presenting with first seizure. In the acute setting this primary exam is utilized to exclude conditions requiring urgent or emergent intervention, such as a bleed (Tranvinh et al., 2019). CT is also appropriate if MRI is contraindicated and to evaluate seizure foci that contain dystrophic calcifications, such as oligodendrogliomas and tuberous sclerosis, yet the overall success of CT in detecting focal lesions in epilepsy is low, at approximately 30% (Expert Panel on Neurological Imaging et al., 2020; Tranvinh et al. 2019). In studies where individuals were evaluated with both MRI and CT, CT failed to detect potentially epileptogenic lesions identified on MRI 16-42% of the time (Tranvinh et al., 2019). Therefore, MRI of the brain is the study of choice to evaluate new-onset seizures (when available), refractory or drug-resistant seizures, prior to discontinuation of anti-epileptic therapy, and known seizure with change in semiology.
- If CT is initially performed, it can be followed by an MRI. If an MRI not using the "Epilepsy Protocol" is initially performed, it can be followed by an MRI with the "Epilepsy Protocol" for greater sensitivity of detection of epileptogenic lesions. The failure rate for detection of lesions improved from 39% to 91% with epilepsy-trained radiologist reading MRI images obtained using a specialized, epilepsy protocol (Expert Panel on Neurological Imaging et al., 2020; Bernasconi et al., 2020; Wellmer et al., 2013).

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Perioperative Evaluations for Drug-Resistant Epilepsy (HD-9.2)

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Criteria

- **ANY** or **ALL** the following requests are considered medically necessary, obtained concurrently or sequentially, for consideration of potential surgery:
  - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553)
    - Follow-up MRI Brain after a previous routine study if performed with special "Epilepsy Protocol" (typically 3T or 7T magnet, thin sections with angled slices through hippocampus and temporal lobes)
  - Metabolic FDG PET (CPT® 78608):
    - Is considered medically necessary for pre-surgical evaluation of refractory seizure when requested by neurosurgeon or neurologist or any provider in consultation with a neurosurgeon or neurologist.
  - Metabolic PET/MRI is MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with (CPT® 70553) co-registered **WITH** FDG-PET Brain (CPT® 78608) and is considered medically necessary for pre-surgical evaluation of refractory seizure when requested by neurosurgeon or neurologist or any provider in consultation with a neurosurgeon or neurologist.
  - Ictal SPECT (CPT® 78803 or 78830)
  - Functional MRI (fMRI) (CPT® 70555 or CPT® 70554)
    - If MRA Head (CPT® 70544) is considered medically necessary but Functional MRI (CPT® 70554 or CPT® 70555) was erroneously ordered, then CPT® 70544 may be substituted when appropriate (see **Functional MRI (fMRI) (HD-24.2)**)
  - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain with and without and with (CPT® 70553)
    - Medically necessary if co-registered with Magnetoencephalography (MEG)
  - Quantitative Magnetic Resonance Image (MRI) Analysis of the Brain
    - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be requested as (CPT® 0865T or CPT® 0866T)
      - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered not medically necessary in the evaluation of epilepsy.
  - AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T.

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        - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.
    - 3D rendering CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) is considered not medically necessary for epilepsy surgery alone. These studies lack sufficient specificity and sensitivity to be clinically useful in the evaluation or follow up of individuals with epilepsy. Their use is limited to research studies and are otherwise considered to be not medically necessary in routine clinical practice. 3D rendering can be included as part of the MRI Brain "Epilepsy Protocol" and should not be billed in conjunction with the MRI Brain. Exceptions include complicated surgical procedures such as craniotomy .
- When non-invasive EEG monitoring is insufficient, intracranial monitoring with stereo-EEG or grids/strips and depth electrodes is considered medically necessary with additional imaging for neuronavigation. See **Neurosurgical Imaging (HD-28.1)** and **Neuronavigation (HD-28.2)**
    - Post-operative imaging including after intracranial (EEG) monitoring per neurosurgeon or neurologist or any provider in consultation with neurosurgeon or neurologist.
- See **Primary Central Nervous System Tumors-General Considerations (ONC-2.1)** in the Oncology Imaging Guidelines and/or **Neurosurgical Imaging (HD-28.1)** for additional imaging requests for surgery

Background and Supporting Information

- Magnetoencephalography (MEG) plays an important role in clarifying the significance of abnormalities seen on both structural and functional imaging, for the purpose of epileptogenic zone localization for surgical planning. When used in conjunction with other techniques, MEG plays a major role in the non-invasive epilepsy surgery evaluation. Currently, the guidelines only require review for the MRI co-registered with MEG.
- MEG followed by co-registration with Brain MRI is referred to as Magnetic Source Imaging (MSI)

Below are examples of surgical treatment or an interventional modality that may be under active consideration for individuals with intractable epilepsy (not all inclusive):

- Focal Resection
    - Temporal Lobe Resection
    - Extratemporal Resection
- Lesionectomy
- Multiple Subpial Transections
- Laser Interstitial Thermal Therapy (LITT)

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- Anatomical or Functional Hemispherectomy and Hemispherotomy
- Corpus Callosotomy
- Stereotactic Radiosurgery
- Neurostimulation Device Implantations (Neuromodulation) including
  - Vagus Nerve Stimulation (VNS)
  - Responsive Neurostimulation (RNS) system also known as NeuroPace
  - Deep Brain Stimulation (DBS)

Evidence Discussion (HD-9.2)

- MRI Head for the initial imaging of individuals with known seizure disorder requiring surgical planning to identify the seizure focus which may include tumor, hippocampal sclerosis, and vascular lesions. Follow-up MRI after a previous standard protocol study if performed with special "Epilepsy Protocol" can provide additional information (Expert Panel on Neurological Imaging et al., 2020).
- FDG-PET/CT Brain may be complementary as a functional tool to structural imaging using MRI to localize the focus of refractory seizure activity, with reported sensitivities of PET in the assessment of temporal lobe epilepsy ranging from 87% to 90% and extra-temporal lobe epilepsy ranging from 38% to 55% (Expert Panel on Neurological Imaging et al., 2020).
- PET/MRI, performed as MRI Brain without contrast, or without and with contrast, co-registered with FDG-PET brain, increased the sensitivity of brain MRI in 60% of non-lesional individuals and is therefore supported for pre-surgical evaluation of refractory seizures (Tóth et al., 2021).
- Ictal SPECT, Functional MRI (fMRI) and MRI Brain co-registered with Magnetoencephalography (MEG) are also useful to further identify the seizure focus as well as eloquent areas of the cortex that are essential for language, motor function and memory in surgical candidates when done as a replacement for the higher risk Wada test or direct electrical stimulation mapping (Szaflarski et al., 2017; Ponisio et al., 2021; Rampp et al., 2019).

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Trigeminal Neuralgia and other Centrally Mediated Facial Pain Syndromes (HD-10)

Guideline

Trigeminal Neuralgia/Trigeminal Neuropathy (HD-10.1)
Glossopharyngeal Neuralgia/Glossopharyngeal Neuropathy (HD-10.2)
Evidence Discussion (HD-10)
References (HD-10)

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Trigeminal Neuralgia/Trigeminal Neuropathy (HD-10.1)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) (with special attention to the skull base) or MRI Brain without contrast (CPT® 70551) **AND/OR** facial imaging, MRI Orbit/Face/Neck without contrast (CPT® 70540) or MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is medically necessary for:
  - symptoms of trigeminal neuropathy
  - trigeminal neuralgia
  - trigeminal neuralgia which involves the ophthalmic nerve, (periorbital or forehead pain), once post-herpetic neuralgia (a complication of shingles) has been excluded by history
- CT Maxillofacial without contrast (CPT® 70486) **OR** CT Maxillofacial with contrast (CPT®70487) is considered medically necessary for evaluating the skull base and neural foramina
- Contrast-enhanced navigation protocol CT (CPT® 76497) is considered medically necessary for gamma knife stereotactic radiosurgery for trigeminal neuralgia, (see also, **Neuronavigation (HD-28.2)** and **Post-Operative Imaging (HD-28.3)**) for post-treatment imaging studies
- MRI Cervical spine without contrast (CPT® 72141) **OR** MRI Cervical spine without and with contrast (CPT® 72156) is considered medically necessary for suspected lesion of the spinal trigeminal tract and nucleus.
- MRA Head (CPT® 70544, CPT® 70545 or CPT® 70546) **OR** CTA Head (CPT® 70496) is considered medically necessary for:
  - trigeminal neuralgia (vascular imaging may be obtained concurrently with structural brain imaging)
  - failed medical treatment
  - surgical planning

Background and Supporting Information

The differential diagnosis of facial pain is extensive, complex, and difficult, and there is considerable case-to-case variation in optimal imaging pathway.

Symptoms of trigeminal neuropathy include facial pain, facial numbness, and/or weakness of the muscles of mastication.

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Trigeminal neuralgia, also known as tic douloureux (the involuntary wincing associated with the occurrence of pain), refers to sudden, severe, shooting "electrical" pains along one or more sensory divisions of the trigeminal nerve, provoked by movements such as chewing, or by external stimuli, such as wind blowing or touching the face.

The spinal trigeminal tract and nucleus extend from the midpons caudally into the upper cervical cord at the C2-4 levels. For suspected lesions of the spinal trigeminal tract and nucleus, imaging the brain stem and the cervical spinal cord is supported.

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Glossopharyngeal Neuralgia/ Glossopharyngeal Neuropathy (HD-10.2)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) **AND/OR** MRI Orbit/Face/Neck without and with contrast (CPT® 70543) or MRI Orbit/Face/Neck without contrast (CPT® 70540) is considered medically necessary for suspected glossopharyngeal neuralgia or neuropathy
- CT Neck with contrast (CPT® 70491) is considered medically necessary to delineate skull-base erosion, deep space neck masses, calcifications, the skull base bony anatomy, and/or the stylohyoid ligament (see also **Eagle Syndrome (Neck-10.3))**
- MRA Head with contrast (CPT® 70545), or MRA Head without and with contrast (CPT® 70546), **AND/OR** MRA Neck with contrast (CPT® 70548), or MRA Neck without and with contrast (CPT® 70549) is considered medically necessary to assess for neurovascular compression for the evaluation of glossopharyngeal neuralgia

Background and Supporting Information

- Glossopharyngeal neuralgia presents as severe pain in the throat and neck, classically triggered by swallowing.
- Glossopharyngeal neuropathy may present with pain, dysphagia, loss of gag reflex, impaired taste, and impaired sensation along posterior one-third of the tongue and/or inability to elevate the palate.

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Evidence Discussion (HD-10)

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- The American Academy of Neurology recommends routine use of MRI in the evaluation of individuals with trigeminal neuralgia (American Academy of Neurology, 2021). Neuroimaging identifies structural causes in up to 15% of individuals. The most commonly identified abnormalities include cerebellopontine angle tumors and multiple sclerosis plaques (American Academy of Neurology, 2021).
- MRI Brain and/or MRI orbits, face and neck are necessary for direct visualization of the entire course of the trigeminal nerve (Rath et al., 2022).
- MRA Head, when combined with MRI Brain for evaluation of vascular compression of the trigeminal nerve, has sensitivity of 97%-100% and specificity of 100%. CTA is less commonly performed concurrently with MRI of the trigeminal nerve (Rath et al., 2022).
- CT maxillofacial may be complementary to MRI in characterizing skull-base erosions, calcifications, and skull-base foramina.
- In the evaluation of glossopharyngeal neuralgia, MRI of the brain and/or MRI orbits, face and neck, allows direct visualization of the entire course of the glossopharyngeal nerve. Imaging should include the pharynx and larynx to exclude a neck mass. To further evaluate bony anatomy, calcifications, and the stylohyoid ligament, CT neck is also appropriate. MRA Head and neck is helpful to exclude neurovascular compression in individuals with glossopharyngeal neuralgia (Rath et al., 2022).

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Headache (HD-11)

Guideline

Headache General Guidelines (HD-11.0)
Headache and Suspected Vascular Dissection (HD-11.1)
Headaches with Red Flags (HD-11.2)
Sudden Onset of Headache (HD-11.3)
Trigeminal Autonomic Cephalgias (HD-11.4)
Skull Base, Orbit, Periorbital or Oromaxillary (HD-11.5)
Suspected Intracranial Extension of Sinusitis or Mastoiditis (HD-11.6)
New Headache Onset Older than Age 50 (HD-11.7)
Cancer or Immunosuppression (HD-11.8)
Abnormal Blood Clotting (HD-11.9)
Pregnancy (HD-11.10)
Physical Exertion (HD-11.11)
Headaches Associated With Head Trauma (HD-11.12)
Systemic Infections (HD-11.13)
Hydrocephalus Shunts (HD-11.14)
Low-Pressure Headache and CSF Leak (HD-11.15)
Cervicogenic Headaches Including Occipital Neuritis/Neuralgia (HD-11.16)
Advanced Imaging Indications Related To Migraines (HD-11.17)
Evidence Discussion (HD-11)
References (HD-11)

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Headache General Guidelines (HD-11.0)

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Criteria

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) or CT Head without contrast (CPT® 70450) are considered medically necessary for **any** of the following:
  - Headache accompanied by seizures, vomiting, focal neurological complaints including dizziness, visual change, altered mental status, or acute hypertension
  - Abnormal examination findings (including, but not limited to, altered mental status, papilledema, focal signs or symptoms including unilateral weakness or sensory loss, hyperreflexia, clonus, increased tone, Hoffman or Babinski sign, loss of coordination, seizures, gait disturbance, cranial nerve abnormality, vision loss, nystagmus, dysarthria, dysphagia, fever, meningismus)
  - For papilledema, see **Papilledema/Pseudotumor Cerebri (HD-17.1)**)
- Chronic headache with significant change in character, severity, or frequency of headache (for example: progressively worsening headache over a period of days or weeks, transformation of established migraine to chronic daily headaches), the following are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553) **OR**
  - CT Head without contrast (CPT® 70450)
  - MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA/CTV Head (CPT® 70496) is considered medically necessary as an addition to evaluate the recent onset of a progressive, severe, daily headache, with or without papilledema and concern for cerebral venous sinus thrombosis.
    - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only **ONE** CPT® code should be used to report both procedures.
- Advanced imaging of the head is considered **NOT** medically necessary for any of the following:
  - Primary headache disorder in the absence of focal neurological deficits or "red flags" (see **Headaches with Red Flags (HD-11.2)** and **Advanced Imaging Indications Related to Migraines (HD-11.17)**)
  - Newly diagnosed migraine or tension-type headache with a normal neurologic exam or for chronic stable headache including migraine with no neurologic deficit.

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- Duplex Ultrasound Carotid Arteries (CPT® 93880) does not have a role in the evaluation of headaches (including migraines), except for suspected carotid dissection (see **Initial Imaging (PVD-3.1)** in the Peripheral Vascular Disease Imaging Guidelines, **Headache and Suspected Vascular Dissection (HD-11.1),** and **Stroke/TIA (HD-21.1)**)

Background and Supporting Information

- The yield of detecting abnormal, treatable lesions by CT or MRI in individuals with headache but normal neurological exam has been found to be low.

Health Equity Considerations

Headache disorders, including migraines, are among the most prevalent and disabling neurological conditions, yet their diagnosis and management are marked by significant disparities across racial, socioeconomic, and geographic lines. Despite comparable prevalence rates, historically marginalized populations are less likely to receive accurate diagnoses, evidence-based treatments, and specialist care, resulting in disproportionate burden and reduced quality of life (Tana et al., 2024).

Headaches can affect well-being and cause disability, yet the majority of countries face issues with limited access to health care, awareness, and insufficient health policies (Raffaelli et al., 2023). Globally, the prevalence of migraines is estimated around 14%, and accounting for 52% of active headache disorder (Tana et al., 2024). It is estimated that a headache disorder will affect 90% of individuals during their lifetime (Florczyk et al., 2024). In the U.S., acute headache is the fourth most common reason for a visit to the emergency room (Viera & Antono, 2022) .

Racial and ethnic minorities in the U.S. may not receive equitable care when compared to White individuals. For example, Black individuals are 40% less likely to be treated by a neurologist and are more likely to end up in emergency departments for an untreated migraine (Tana et al., 2024).

Headache disorders can present within a wide range of severity, which calls for levels of care for headache services (Raffaelli et al., 2023). However, a dearth in headache education in medical studies results in inadequate diagnoses and treatment, limiting access to proper care (Raffaelli et al., 2023). Telemedicine, which is the remote delivery of healthcare, can allow individuals access to services that may otherwise be inaccessible due to factors such as long waiting times or long-distance travel (Raffaelli et al., 2023). However, this requires access to technology and infrastructure, as well as technological literacy, for individuals who may not possess the necessary tools (Raffaelli et al., 2023).

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Headache and Suspected Vascular Dissection (HD-11.1)

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Criteria

- CTA Neck (CPT® 70498) and MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) are considered medically necessary in the evaluation for headache with suspected carotid or vertebral artery dissection and in certain high-risk scenarios including, but not exclusive to: Fibromuscular dysplasia (FMD), Marfan disease, acute MVA with whiplash, and acute headache and/or neck pain due to chiropractic manipulation.
  - CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) is considered medically necessary if there is concern for extension of a carotid dissection to the skull base or above. CTA Head and Neck (CPT® 70471) must be substituted when both CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed during the same session.
  - Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebro-basilar system.
- MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498) is considered medically necessary if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist, neurosurgeon, interventional radiologist, interventional cardiologist or any provider in consultation with one of the above named specialists).
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496, or CPT® 70498) is considered medically necessary if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist, neurosurgeon, interventional radiologist, interventional cardiologist or any provider in consultation with one of the above named specialists).
- Other vascular imaging indications for headaches require additional information.
  - See **Stroke/TIA (HD-21.1)**, **Sudden Onset of Headache (HD-11.3)**, **New Headache Onset Older than Age 50 (HD-11.7)**, **Abnormal Blood Clotting (HD-11.9)**, **Pregnancy (HD-11.10)**, **Physical Exertion (HD-11.11)**, and **Systemic Infections (HD-11.13)**

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Headaches with Red Flags (HD-11.2)

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Criteria

- Headaches with any of the following Red Flags:
  - If any of the below unusual symptoms or history are present, advanced imaging studies are considered medically necessary (see relevant section):
    - Cancer history or immunosuppression (see **Cancer or Immunosuppression (HD-11.8)**)
    - Sudden onset (see **Sudden Onset of Headache (HD-11.3)**)
    - New onset age >50 (see **New Headache Onset Older than Age 50 (HD-11.7)** and **Migraine Exceptions (HD-11.17)**)
    - History of head trauma (see **Headaches Associated with Head Trauma (HD-11.12)**, and **Head and Facial Trauma (HD-13)**)
    - Headache precipitated by cough or Valsalva, physical exertion, or sexual activity (see **Physical Exertion (HD-11.11)**)
    - Currently pregnant (including pregnancy and the immediate postpartum period) (see **Pregnancy (HD-11.10)**)
    - Hypercoagulable state or bleeding disorder (see **Abnormal Blood Clotting (HD-11.9)**)
    - New persistent headache (see **Migraine Exceptions (HD-11.17)**)
    - Headache awakens individual from sleep (see **Sudden Onset of Headache (HD-11.3)**)

Background and Supporting Information

Aura symptoms may accompany or precede a headache within 60 minutes and may include, but are not exclusive to, the following symptoms:

- Visual (flashing lights, loss of vision)
- Sensory (paresthesia)
- Speech and/or language (difficulty speaking)
- Motor (any weakness)
- Brainstem (dizziness, double vision) and retinal (visual complaints)

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Sudden Onset of Headache (HD-11.3)

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Criteria

- For sudden onset of headache including:
  - worst, most severe headache ever experienced or thunderclap-type (example: awakening from sleep)
  - sudden onset unilateral headache, suspected carotid or vertebral dissection or ipsilateral Horner's syndrome
  - consideration of reversible cerebral vasoconstriction syndrome (RCVS) (typically bilateral headache)
  - high-risk scenarios including Fibromuscular Dysplasia (FMD), Marfan Disease, MVA with whiplash, and chiropractic manipulation
- If any of these onset of headache features are present, the following are considered medically necessary:
  - CT Head without contrast (CPT® 70450) **OR** MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - CTA Head (CPT® 70496) **or** MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546)
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR** CTA Neck (CPT® 70498) if carotid or vertebral artery dissection is suspected
    - CTA Head and Neck (CPT® 70471) combination code must be substituted when both CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed in the same session.
    - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only **ONE** CPT® code should be used to report both procedures
- Repeat MRI Brain and/or MRA/CTA Head and Neck imaging is considered medically necessary in 2-4 weeks if suspicion of Reversible Cerebral Vasoconstriction Syndrome (RCVS) is high and to follow up until resolution of vasospasm, edema and/or hemorrhage, at the discretion of the neurologist, neurosurgeon, hematologist, or physiatrist, or any provider in consultation with a neurologist, neurosurgeon, hematologist, or physiatrist
- MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498) is considered medically necessary if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist, neurosurgeon, interventional

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radiologist, interventional cardiologist, or any provider in consultation with one of the above named specialists).

- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496, CPT® 70498) is considered medically necessary if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist or neurosurgeon or any provider in consultation with a neurologist, neurosurgeon, interventional radiologist, interventional cardiologist, or any provider in consultation with one of the above named specialists).
- CTA Head and Neck (CPT ® 70471) combination code must be substituted when both CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed in the same session
- Other vascular imaging indications for headaches require additional information.
  - See **Stroke/TIA (HD-21.1)**, **New Headache Onset Older than Age 50 (HD-11.7)**, **Abnormal Blood Clotting (HD-11.9)**, **Pregnancy (HD-11.10)**, **Physical Exertion (HD-11.11)**, **Cerebral Aneurysms (HD-12.1)** and **Systemic Infections (HD-11.13)**

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Trigeminal Autonomic Cephalgias (HD-11.4)

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Criteria

- For trigeminal autonomic cephalgias and cluster headache, the following are considered medically necessary:
  - MRI Brain without and with contrast (CPT® 70553) **OR**
  - MRI Brain without contrast (CPT® 70551)
  - May also include pituitary screening (see **Pituitary, Sella, Hypothalamus (HD-19)**)
- For facial pain (see **Trigeminal Neuralgia and other Centrally Mediated Facial Pain Syndromes (HD-10))**

Background and Supporting Information

Trigeminal autonomic cephalgias includes cluster headache, short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) syndromes; short-lasting unilateral neuralgiform headache attacks with cranial autonomic symptoms (SUNA) and hemicrania paroxysmal and continua.

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Skull Base, Orbit, Periorbital or Oromaxillary (HD-11.5)

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Criteria

- Skull base, orbital, periorbital or oromaxillary imaging is considered medically necessary for concern of skull base tumors in individuals with head and neck cancers, other skull base abnormalities seen on previous imaging, any invasive sinus infections as well as sinus tumors or orbital tumors with intracranial extension.
- In these clinical scenarios, the following studies are considered medically necessary:
  - MRI Brain and/or Orbits/Face/Neck without and with contrast (CPT® 70553 and/or CPT® 70543) **OR**
  - MRI Brain and/or Orbits/Face/Neck without contrast (CPT® 70551 and/or CPT® 70540) **OR**
  - CT Head and/or Orbits/Temporal bone without and with contrast (CPT® 70470 and/or CPT® 70482) **OR**
  - CT Head and/or Orbits/Temporal bone with contrast (CPT® 70460 and/or CPT® 70481)

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Suspected Intracranial Extension of Sinusitis or Mastoiditis (HD-11.6)

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Criteria

- For suspected intracranial extension of sinusitis or mastoiditis, the following is considered medically necessary:
  - MRI Brain without and with contrast (CPT® 70553)
  - See **Mastoid Disease or Ear Pain (HD-26.1)** and **Skull Base, Orbit, Periorbital or Oromaxillary (HD-11.5)**

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New Headache Onset Older than Age 50 (HD-11.7)

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Criteria

- For new onset headache in individuals older than 50 years of age, the following are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553) **OR**
  - CT Head without contrast (CPT® 70450)
  - If Giant Cell Arteritis, also known as Temporal Arteritis, is suspected, MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546), see **Cerebral Vasculitis (HD-22)**

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Cancer or Immunosuppression (HD-11.8)

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Criteria

- For new headache in individuals with cancer, history of cancer, or those who are immunocompromised, the following are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553)
- For CT imaging in the setting of individuals with cancer, with history of cancer or who are immunocompromised, see **General Guidelines – CT Head (HD-1.4)**
- See also **Primary Central Nervous System Tumors – General Considerations (ONC-2.1)** and **Brain Metastases (ONC-31.3)**

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Abnormal Blood Clotting (HD-11.9)

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Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **OR** CT Head without contrast (CPT® 70450) is considered medically necessary for:
  - new onset headaches in individual with hypercoagulable states or bleeding disorder
    - MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA/CTV Head (CPT® 70496) is considered medically necessary, in addition, for venogram when requested.
      - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only **ONE** CPT® code should be used to report both procedures
  - individuals with new onset headaches and potential for bleeding diathesis
    - Taking anticoagulants or two or more anti-aggregants or having a medical condition that predisposes to bleeding (for example, but not limited to: thrombocytopenia, liver failure, idiopathic thrombocytopenic purpura (ITP), etc.).

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Pregnancy (HD-11.10)

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Criteria

- For new onset headache during pregnancy or immediate post-partum period (within 3 months after delivery), ANY or ALL of the following are considered medically necessary:
  - MRI Brain without contrast (gadolinium relatively contraindicated in pregnancy) (CPT® 70551)
  - CT Head without contrast (CPT® 70450) if urgent
  - MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA/CTV Head (CPT® 70496) when venogram is requested
    - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures. (gadolinium relatively contraindicated in pregnancy)
    - Vascular imaging is considered medically necessary concurrently with brain imaging
- Important causes of secondary headache include vascular disorders, such as pre-eclampsia, reversible cerebral vasoconstriction syndrome, and cerebral venous thrombosis, as well as idiopathic intracranial hypertension
- For post-LP/epidural anesthesia, see **Low-Pressure Headache and CSF Leak (HD-11.15)**

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Physical Exertion (HD-11.11)

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Criteria

- For onset of headache with Valsalva maneuver, cough, physical exertion, change in position, **or** sexual activity, but not merely a worsening of a pre-existing headache with these activities, the following procedures are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553) **OR**
  - CT Head without contrast (CPT® 70450) **AND/OR**
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR**
  - CTA Head without and with contrast (CPT® 70496)
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498) if carotid or vertebral artery dissection or aneurysm is suspected
    - CTA Head and Neck (CPT ® 70471) combination code must be substituted when both CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed in the same session.

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Headaches Associated With Head Trauma (HD-11.12)

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Criteria

- For new or progressively worsening headache with subacute head trauma, defined as within 7 days to three months post-trauma, with or without unexplained cognitive or neurologic deficits, the following are considered medically necessary:
  - CT Head without contrast (CPT® 70450) **OR**
  - MRI Brain without contrast (CPT® 70551)
- For persistent headaches attributed to traumatic injury to the head persisting for longer than 3 months following the injury, with or without unexplained cognitive or neurologic deficits, the following are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) **OR**
  - CT Head without contrast (CPT® 70450)
- MRI Brain without and with contrast (CPT® 70553) is medically necessary if post-traumatic infection is suspected
- Acute head trauma with headache, (see **Head Trauma (HD-13.1))**
- Acute headache attributed to traumatic injury to the head that developed within 7 days of injury that does not meet criteria under **Head and Facial Trauma (HD-13)**, other subsections may apply including, but not exclusive to: **Headaches with Red Flags (HD-11.2)** and **Sudden Onset of Headache (HD-11.3)**

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Systemic Infections (HD-11.13)

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Criteria

- For headaches in the setting of acute, subacute, or chronic systemic infections, the following are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551); or MRI Brain without and with contrast (CPT® 70553)
  - MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546)
    - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures
  - CT Head without contrast (CPT® 70450) or CT Head without and with contrast (CPT® 70470), when MRI Brain is contraindicated (see **General Guidelines – CT Head (HD-1.4)** for additional CT Head indications)
  - CT Head without (CPT® 70450) prior to performance of lumbar puncture (aka spinal tap)
- See **CNS and Head Infection (HD-14.1)**
- See **Neuro-COVID-19 and Sars-CoV-2 Vaccines (HD-14.2)** for headache related to neuro-COVID-19 or SARS-CoV-2 vaccines

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Hydrocephalus Shunts (HD-11.14)

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Criteria

Initial Imaging Indications

- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary

Repeat Imaging Indications including CSF flow shunting and Ventriculostomy

- MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is considered medically necessary for any of the following:
  - New signs or symptoms suggesting shunt malfunction or endoscopic third ventriculostomy (ETV) malfunction
    - Symptoms may include but are not limited to: sepsis after shunt setting adjustments, decreased level of consciousness, protracted vomiting, visual or neurologic deterioration, decline of mentation after initial improvement, or new or changing pattern of seizures
  - Requests ordered by a neurologist, neurosurgeon, or any provider in consultation with a neurologist or neurosurgeon
- MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is considered medically necessary in the post-operative period following shunt placement or ETV, with further follow-up imaging 6-12 months after the procedure and then every 12 months for individuals with stable clinical findings
- Shunting into the peritoneum (VP shunts) can give rise to abdominal complications, but these are generally symptomatic, so surveillance imaging of the abdomen is considered not medically necessary unless ordered by or in consultation with neurology, neurosurgery, or interventional radiology.
  - Abdominal ultrasound (CPT® 76700) **AND/OR** CT Abdomen or CT Abdomen/Pelvis (contrast as requested), is considered medically necessary depending on the clinical suspicion
    - Examples include, but are not limited to, suspicion of CSF pseudocyst formation, distal shunt outlet obstruction, or infection.
- See **General Guidelines – Other Imaging Situations (HD-1.7)**

Additional Rarely Used Studies

- Cisternogram (CPT® 78630) is considered medically necessary for the following:
  - Known hydrocephalus with worsening symptoms.
  - Suspected obstructive hydrocephalus.

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  - Suspected normal pressure hydrocephalus with gait disturbance and either dementia or urinary incontinence.
  - For indications related to CSF Leak, (see **Low-Pressure Headache and CSF Leak (HD-11.15)** and **Nuclear Medicine (HD-36.1)**)
- Cerebrospinal Ventriculography (CPT® 78635) is considered medically necessary for the following:
  - Evaluation of internal shunt, porencephalic cyst, or posterior fossa cyst.
- Nuclear Medicine Shunt Evaluation (CPT® 78645) and CSF Flow SPECT (CPT® 78803) is considered medically necessary for the following:
  - Suspected malfunction of ventriculoperitoneal, ventriculopleural, or ventriculovenous shunts.
- For CSF flow imaging, see **CSF Flow Imaging (HD-24.4)**
- See also **General Guidelines - CT Head (HD-1.4)**

Background and Supporting Information

- Ventriculomegaly is the condition where ventricles are enlarged, and this may be due to 1) hydrocephalus, a condition of increased intracranial pressure (ICP) (imaging shows ventricles are disproportionately enlarged compared to sulci), or 2) brain atrophy, most commonly related to age or trauma, which is not associated with increased ICP (imaging shows ventricles and sulci are proportionately enlarged).
- Hydrocephalus is divided into obstructive/non-communicating vs. communicating types, and these usually have different etiologies and radiographic features.
- Obstructive or non-communicating hydrocephalus classically involves an intraventricular obstruction in which CSF flow over the convexities and between the ventricles is reduced, and the proximal ventricle(s) is/are dilated. This is a medical emergency.
- Communicating hydrocephalus involves extraventricular obstruction, poor absorption, or overproduction of CSF. There is normal intracranial CSF flow and absence of disproportionate ventricular dilation, yet there is still a mildly increased CSF pressure. Normal pressure hydrocephalus is an example of this type.
- Distinguishing between ventriculomegaly due to brain atrophy and non-communicating hydrocephalus can be difficult with MRI Brain or CT Head alone, and modalities which visualize CSF flow may be useful such as cisternography or CT cisternography.

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Low-Pressure Headache and CSF Leak (HD-11.15)

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Criteria

- Evaluation of suspected CSF leak (rhinorrhea/otorrhea) or refractory post-lumbar puncture headache, post-spinal surgery headache, orthostatic headache, or low-pressure headache:

Indication	Medically Necessary Imaging
Intracranial imaging	• MRI Brain without contrast (CPT® 70551) or • MRI Brain without and with contrast (CPT® 70553)
Spinal imaging (MRI)	• MRI Cervical Spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) or without and with contrast (CPT® 72157) **AND/OR** • MRI Lumbar Spine without contrast (CPT® 72148) or without and with contrast (CPT® 72158)
Spinal imaging, post-myelogram	• CT Cervical Spine with contrast (CPT® 72126) **AND/OR** • CT Thoracic Spine with contrast (CPT® 72129) **AND/OR** • CT Lumbar Spine with contrast (CPT® 72132)
Spinal imaging, MR myelogram	• MRI Spine, contrast as requested • Requests following initial negative/non-diagnostic MRI Spine and MRI Brain are also considered medically necessary

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Indication	Medically Necessary Imaging
Cisternogram, radionucleotide (111 In-DTPA)	• Radionucleotide cisternogram (CPT® 78630)
Cisternogram, post-myelogram (iodinated contrast)	• CT Head with contrast (CPT® 70460) **OR** • CT Maxillofacial with contrast (CPT® 70487) **OR** • CT Temporal Bone with contrast (CPT® 70481)
Symptoms of CSF rhinorrhea or otorrhea	• CT Head without contrast (CPT® 70450) **AND/OR** • CT Maxillofacial without contrast (CPT® 70486) **OR** • CT Temporal Bone without contrast (CPT® 70480)

- Additional Cisternogram (CPT® 78630) indications:
  - Known hydrocephalus with worsening symptoms (for example headache)
  - Suspected obstructive hydrocephalus
- Individuals with a Shunt (see **Hydrocephalus Shunts (HD-11.14)**)

Background and Supporting Information

- Common radiological findings of CSF leaks include abnormalities of the cribriform plate or ethmoid sinus, dural dehiscence at the anterior skull base, pneumatization of the sphenoid sinus, and fluid within the middle ear.
- CSF leaks may occur in:
  - CSF shunt over-drainage
  - traumatic CSF leaks
    - Thecal holes and rents from lumbar punctures and epidural catheterizations
    - Spinal and cranial surgeries including skull base and some sinus surgeries
    - Proximal brachial plexus and nerve root avulsion injuries
  - Spontaneous leaks may occur in, but are not exclusive to:
    - Pre-existing weakness of the dural sac including:
      - disorders of connective tissue matrix including Marfan syndrome, Marfanoid features

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  - joint hypermobility
- Trivial trauma in the setting of preexisting dural weakness
- Spondylotic spurs, herniated discs

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Cervicogenic Headaches Including Occipital Neuritis/Neuralgia (HD-11.16)

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Criteria

- Brain imaging should follow applicable sections in **Headache (HD-11)**
- MRI Cervical Spine without contrast (CPT® 72141) is considered medically necessary for:
  - failure of 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed and clinical re-evaluation after treatment period (unless presence of a red flag) as defined in **Red Flag Indications (SP-1.2)**
    - See **Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) (SP-3.1)** and **Neck (Cervical Spine) Trauma (SP-3.2)** in the Spine Imaging Guidelines
    - Exemptions to the 6 weeks of conservative care include:
      - high-risk mechanism of cervical spine injury within the last 3 months (see **Neck (Cervical Spine) Trauma (SP-3.2)** in the Spine Imaging Guidelines)
      - **Red Flag Indications (SP-1.2)** in the Spine Imaging Guidelines
      - **ANY** of the following:
        - Bony abnormalities: Atlanto-axial dislocations/instability (including but not limited to: Down's syndrome, Ehlers-Danlos and Marfan syndromes and rheumatoid arthritis), platybasia, osteomas, callous formation of the posterior C1/2 arches
        - Posterior fossa lesions, Chiari malformations, demyelinating disease
        - Myelopathy/myelitis (see **Myelopathy (SP-7.1)** in the Spine Imaging Guidelines)

Background and Supporting Information

- Cervicogenic Headache
  - Headache caused by a disorder of the cervical spine, usually accompanied by neck pain or other signs and symptoms of cervical disease. Typical findings include reduced cervical range of motion, side-locked pain, and symptoms exacerbated by provocative maneuvers such as head movement or digital pressure.
- Occipital Neuralgia/Neuritis - Occipital neuralgia is classified unilateral or bilateral paroxysmal, shooting or stabbing pain in the posterior part of the scalp, in the

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distribution(s) of the greater, lesser and/or third occipital nerves, sometimes accompanied by diminished sensation or dysaesthesia in the affected area and commonly associated with tenderness over the involved nerve(s).

- Pain has at least two of the following three characteristics:
  - Recurring in paroxysmal attacks lasting from a few seconds to minutes
  - Severe in intensity
  - Shooting, stabbing or sharp in quality
- Pain is associated with both of the following:
  - Dysaesthesia and/or allodynia apparent during innocuous stimulation of the scalp and/or hair
  - Either or both of the following:
    - Tenderness over the affected nerve branches
    - Trigger points at the emergence of the greater occipital nerve or in the distribution of C2
- Pain is eased temporarily by local anesthetic block of the affected nerve(s)

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Advanced Imaging Indications Related To Migraines (HD-11.17)

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Criteria

- Advanced imaging of the head is considered **NOT** medically necessary for newly diagnosed migraine with a normal neurological exam or chronic stable migraine with no neurological deficit and/or no red flags (see **Headaches with Red Flags (HD-11.2)**).
  - See below for advanced imaging indications related to migraines.
- New migraine with age 50 years of age or older (see **New Headache Onset Older than Age 50 (HD-11.7)**)
- Change in frequency or severity of migraine (see **Headaches with Red Flags (HD-11.2)**)
- MRI Brain without (CPT® 70551) or MRI Brain without and with (CPT® 70553) or CT Head without (CPT® 70450) for the following:
  - Unusual, prolonged, or persistent aura (greater than 60 minutes) (See *Background and Supporting Information*)
  - Worst migraine
  - Hemiplegic migraine
    - Migraine with any motor weakness.
  - Migrainous accompaniments
    - Passing neurological symptoms that can affect vision, speech, movement, and behavior-“mimic stroke”
  - Migraine aura without headache
    - Migraine with an aura in which the aura is neither accompanied nor followed by a headache within 60 minutes.
  - Side-locked migraine (unilateral)
    - Unilateral hemicranial pain – includes primary and secondary causes.
      - New daily persistent headache (new daily headache present greater than three months)
      - Trigeminal autonomic cephalgias includes cluster headache short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) syndromes; short-lasting unilateral neuralgiform headache attacks with cranial autonomic symptoms (SUNA) and hemicrania paroxysmal and continua are covered in **Trigeminal Autonomic Cephalgias (HD-11.4)**
  - Post-traumatic migraine

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- See **Head Trauma (HD-13.1)** and **Headaches Associated with Head Trauma (HD-11.12)**

Background and Supporting Information

- Aura symptoms may accompany or precede a headache within 60 minutes and may include, but are not exclusive to, the following symptoms:
  - Visual (flashing lights, loss of vision)
  - Sensory (paresthesia)
  - Speech and/or language (difficulty speaking)
  - Motor (any weakness)
  - Brainstem (double vision) and retinal (visual complaints)

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Evidence Discussion (HD-11)

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- The majority of headaches are due to benign causes and are self-limited. The yield of positive findings on a CT Head for evaluation of headache in the emergency department setting ranged from 7% to 13% (Utukuri et al., 2022).
- The American College of Radiology in the Choosing Wisely campaign recommended against imaging for primary headache syndromes in the absence of "red flags" and with a normal neurologic exam (Utukuri et al., 2022; Loder et al., 2013). The American Headache Society and Choosing Wisely Task Force stated that the overuse or misuse of imaging studies for headache was the most commonly mentioned problem (Loder, et al., 2013). Overuse of CT Head was identified as the main concern. The authors note that a single CT scan of the head exposes individuals to an average of 2 millisievert (mSV) of radiation, the equivalent of 8 months of background radiation (Loder et al., 2013).
- Incidental findings are common and can result in anxiety for the individual, additional referrals and specialist consults, and more imaging studies (Ray & Hutton, 2022; Morris et al., 2009). Incidental findings on MRI occur in 2% of the general population (Morris et al., 2009).
- The American Headache Society and the American Academy of Neurology recommended neuroimaging in individuals with headaches with atypical features, "red flags", and/or abnormal neurologic exam findings (Utukuri et al., 2022; Evans et al., 2020; Frishberg et al., 2000).
- The presence of neurologic or systemic signs, new headaches over age 50, or headaches in the setting of malignancy or immunosuppression, always require further evaluation with advanced imaging, and are considered "red flags," due to the higher likelihood of intracranial pathology (Utukuri et al., 2022; Ray & Hutton, 2022; Do et al., 2019; Holle & Obermann, 2013). CT Head in the presence of "red flags" is helpful to exclude intracranial hemorrhage (Utukuri et al., 2022). However, MRI Brain has higher contrast resolution than CT Head and is preferred for evaluation of structural pathologies, particularly in non-urgent settings (Utukuri et al., 2022).
- Subarachnoid hemorrhage due to ruptured cerebral aneurysm accounts for 4%-12% of acute severe headaches (Utukuri et al., 2022). CT Head is considered medically necessary as initial imaging for thunderclap headache. CT Head had a negative predictive value between 99.9%-100% in detecting aneurysmal subarachnoid hemorrhage within 6 hours of headache onset. The sensitivity is over 90% when CT Head is performed within the first 24 hours. CT Angiography (CTA) Head obtained concurrently or in follow up may identify cerebral aneurysm, dissection, and reversible cerebral vasoconstriction syndrome (Utukuri et al., 2022).

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- In selected cases, CT Head is supported for evaluation and follow up of headache caused by subdural or epidural hemorrhage, skull fracture, sinus infection or subarachnoid hemorrhage (Ray & Hutton, 2022).
- New headaches in the setting of pregnancy and the postpartum period require special consideration (Utukuri et al., 2022; Ray & Hutton, 2022; Shoberi & Torabinejad, 2019).
- Over a third of pregnant women presenting to the hospital with headache have a secondary cause (Utukuri et al., 2022; Raffaelli et al., 2018; Shoberi & Torabinejad, 2019). Of individuals with headache in the immediate postpartum period, 41% had an abnormal MRI Brain (Shoberi & Torabinejad, 2019).
  - Imaging in this scenario includes MRI Brain, MR Venogram (MRV) Head, and/or MR Angiography (MRA) Head. Gadolinium contrast is relatively contraindicated during pregnancy and should be avoided (Utukuri et al., 2022).
- Trigeminal autonomic cephalgias, including cluster headaches, are required to have MRI brain to exclude pathology in the pituitary region (Utukuri et al., 2022; Ray & Hutton, 2022). MRI should include the brain and the pituitary region (Utukuri 2022 et al.; Evans et al., 2020).
- Headaches concerning for raised intracranial pressure or intracranial hypotension, required additional evaluation with neuroimaging (Utukuri et al., 2022; Frishberg et al., 2000). To exclude hydrocephalus, a mass, or cerebral venous sinus thrombosis, MRI Brain, Orbits, and Venogram are considered medically necessary in the setting of papilledema and/or intracranial hypertension (Utukuri et al.. 2022; Frishberg et al., 2000). In urgent cases, a CT Head can rapidly diagnose causes such as mass, edema, or hydrocephalus (Utukuri et al., 2022).
- MRI is also useful to evaluate for structural causes of headache due to intracranial hypotension and cerebrospinal (CSF) leaks (Utukuri et al., 2022; Frishberg et al., 2000). Depending on the suspected source of the leak, imaging the brain and spinal cord may be required. Spinal imaging may include MRI of the spinal cord, or CT myelogram (Utukuri et al.,2022).
- In the evaluation of headaches from suspected intracranial hypotension with negative initial brain and spine imaging, and high clinical suspicion of a CSF leak, MR myelography is indicated to detect subtle spinal leak sources, such as CSF-venous fistulas and slow meningeal diverticular leaks (Timpone et al., 2024).
- CTA Head or MRA Head in the evaluation of headache are considered medically necessary for suspicion of carotid or vertebral arterial dissections, AVMs and cerebral aneurysm, as secondary causes of headache (Utukuri et al., 2022).
- CT Venogram (CTV) head or MRV head in the evaluation of headache are supported for suspicion of cerebral venous sinus thrombosis or stenosis in select cases, included suspected headache associated with pregnancy and the post-partum period, headache with papilledema, intracranial hypertension, and the trigeminal autonomic cephalgias (Utukuri et al., 2022).

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- Computerized tomography (CT) is the gold standard for the evaluation of abdominal complications related to ventriculoperitoneal shunts (VPS) (Ferreira et al., 2021).

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Cerebral Aneurysm and AVM (HD-12)

Guideline

Cerebral Aneurysms (HD-12.1)
Arteriovenous Malformations (AVMs) and Related Lesions (HD-12.2)
Evidence Discussion (HD-12)
References (HD-12)

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Cerebral Aneurysms (HD-12.1)

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Criteria

Disorders and Indications (Any of the following)	Medically Necessary Imaging
Coarctation of the aorta	See **Aortic Coarctation and IAA (interrupted aortic arch) (PEDCD-2.4.11)**
Screening for high-risk populations as defined by the following criteria (screening usually begins at age 20 unless unusual circumstances as aneurysms are uncommon in children and adolescents): • Positive Family History: Two or more first-degree relatives (parent, sibling, or child) with history of cerebral aneurysm or subarachnoid hemorrhage (SAH): screening every 5 years beginning at age 20. One firstdegree relative (parent, sibling, or child) with history of cerebral aneurysm or SAH can have one screening study • Autosomal dominant polycystic kidney disease (screening begins at age 20 to 65 and is repeated at five-year intervals) • Alpha-1-antitrypsin deficiency • Alpha-glucosidase deficiency • Azygos anterior cerebral artery (presence of) • Bicuspid aortic valve • Fibromuscular dysplasia (one screening study after confirmed diagnosis) • Ehlers-Danlos Syndrome Type 4 (Vascular) • Glucocorticoid-remediable aldosteronism (GRA) • Hereditary hemorrhagic telangiectasia (Osler-Weber-Rendu Syndrome) See **Screening for Vascular related genetic connective tissue Disorders (PVD-2.2)**	• CTA Head (CPT® 70496) **OR** • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546)

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
Screening for high-risk populations as defined by the following criteria (screening usually begins at age 20 unless unusual circumstances as aneurysms are uncommon in children and adolescents) - ***CONTINUED***: • Kawasaki disease • Klinefelter syndrome • Klippel-Trenaunay-Weber Syndrome • Loeys-Dietz Syndrome • Marfan Syndrome • Microcephalic osteodysplastic primordial dwarfism • Neurofibromatosis Type 1 • Noonan Syndrome • Pheochromocytoma • Pseudoxanthoma elasticum • Tuberous sclerosis See **Screening for Vascular related genetic connective tissue Disorders (PVD-2.2)**	• CTA Head (CPT® 70496) **OR** • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546)
New or worsening clinical symptoms or signs of cerebral aneurysm, including: • Thunderclap headache (see **Sudden Onset of Headache (HD-11.3)**) • Third nerve palsy with pupillary involvement (pupil-sparing third nerve palsies are not caused by external compression) • Suspicion of aneurysm bleed [CT head or MRI brain or CSF exam showing evidence of SAH or intracerebral hemorrhage] • Abnormal CT Head or MRI Brain suggesting possible aneurysm	• CTA Head (CPT® 70496) **OR** • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR** • MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553)
Questionable or equivocal findings on an initial MRA Head	CTA Head (CPT® 70496)

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
For suspected or confirmed cerebral aneurysm, ruptured or unruptured, for initial evaluation, treatment, intervention, or follow-up **OR** If initial catheter angiography is negative, repeat imaging is considered medically necessary.	3D Rendering (CPT® 76377 or CPT® 76376) with cervicocerebral angiography/arteriography and/ or cerebral angiography (See **General Guidelines - Other Imaging Situations (HD-1.7)**)
Follow-up of known cerebral aneurysm: The optimal interval and duration for radiologic follow-up has not been determined. Radiographic follow-up for unruptured or treated intracranial aneurysms upon request by the neurosurgeon or team managing the intracranial aneurysm.	• CTA Head (CPT® 70496) **OR** • MRA Head (CPT® 70544, CPT® 70545 or CPT® 70546) **AND/OR** • MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553)
Additional physical characteristics of a known aneurysm: • To evaluate and treat a giant aneurysm (>2.5 cm) • Posterior fossa aneurysms • Thrombosed or partially thrombosed aneurysms • To evaluate the relationship of the aneurysm to the dura • To evaluate for the presence of calcification • Other surveillance criteria as per the neurosurgeon or team managing the aneurysm repair	• MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553)
Follow up of cerebral aneurysm located in the vertebro-basilar circulation OR If intracranial etiology of SAH has not been found	• MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR** • CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
Subacute complications (i.e., vasospasm, delayed cerebral ischemia, and hydrocephalus), beginning days to weeks, arising from a subarachnoid hemorrhage and/or aneurysm treatment, upon request from the neurosurgeon and/or team managing the episode	CT Head **OR** MRI Brain contrast as requested
To evaluate individuals with SAH and negative studies for brain aneurysm in whom spinal abnormalities (i.e., AVM) may be suspected as the cause of hemorrhage	MRI Spine (Cervical without and with contrast CPT® 72156, **AND/OR** Thoracic without and with contrast CPT® 72157, **AND/OR** Lumbar without and with contrast CPT® 72158)
Catheter angiogram negative in SAH individual with remaining suspicion for cerebral aneurysm and these studies have not yet been performed:	• CTA Head (CPT® 70496) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545 or CPT® 70546)

- High-risk scenarios for vascular dissection include, but are not limited to: Fibromuscular dysplasia (FMD), Marfan Disease, MVA with whiplash, and chiropractic manipulation
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498) if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon)
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496, CPT® 70498) if arterial dissection is suspected, or known and re-evaluation is needed (as directed by neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon)
  - CTA Head and Neck (CPT® 70471) combination code must be substituted when both CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) are performed in the same session.
- Other vascular imaging indications for headaches require additional information. See **Stroke/TIA (HD-21.1)**,**Sudden Onset of Headache (HD-11.3)**, **New Headache Onset Older than Age 50 (HD-11.7)**, **Abnormal Blood Clotting (HD-11.9)**, **Pregnancy (HD-11.10)**, **Physical Exertion (HD-11.11)**, and **Systematic Infections (HD-11.13)**

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Arteriovenous Malformations (AVMs) and Related Lesions (HD-12.2)

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Criteria

Disorders and Indications (Any of the following)	Medically Necessary Imaging
Any aneurysmal and/or AVM disorders listed in this guideline • When MRI contraindicated • Any urgent setting	• CT Head without contrast (CPT® 70450) **AND/OR** • CTA Head (CPT® 70496) **AND/OR** • CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
Known AVM • When requested by a neurologist, neurosurgeon, or any provider in consultation with a neurologist or neurosurgeon	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRA Head (CPT® 70544, CPT®70545, CPT® 70546) **OR** • CTA Head (CPT® 70496)

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
Known AVM in the vertebral-basilar system • When requested by a neurologist, neurosurgeon, or any provider in consultation with a neurologist or neurosurgeon	• Imaging as listed above in "known AVM" **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548, OR CPT® 70549) **OR** • CTA Neck (CPT® 70498) **OR** • CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
Subarachnoid Hemorrhage (SAH) • AVM is suspected based on a history of SAH	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)
Hereditary Hemorrhagic Telangiectasia (HHT; Osler-Weber-Rendu Syndrome) • Suspected based on family history with at least one affected first-degree relative (biological parent or sibling) • At diagnosis, especially if confirmed by genetic testing • Screening for confirmed HHT • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist, neurosurgeon, or geneticist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, CPT® 70546) **OR** • CTA Head (CPT® 70496)

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
Capillary Malformation-Arteriovenous Malformation (CM-AVM) • Suspected based on family history with at least one affected first-degree relative (biological parent or sibling) • At diagnosis, especially if confirmed by genetic testing • Screening for confirmed CM-AVM • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist, neurosurgeon, or geneticist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
Cerebral Cavernous Malformations (CCM) • At diagnosis, especially if confirmed by genetic testing • Screening for confirmed CCM • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist, neurosurgeon, or geneticist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)

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Disorders and Indications (Any of the following)	Medically Necessary Imaging
Microcephalic Osteodysplastic Primordial Dwarfism, Type II (MOPD II) • At diagnosis, especially if confirmed by genetic testing • Screening for confirmed MOPD II, repeated annually • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist, neurosurgeon, or geneticist	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548, OR CPT® 70549) **OR** • CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT ® 70471) must be substituted if performed during the same session.
Sturge-Weber Syndrome • At diagnosis • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) **OR** • MRI Orbits/Face/Neck without contrast (CPT® 70540)

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- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551), **OR** CT Head without contrast (CPT® 70450) **AND/OR** MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) is considered medically necessary for symptoms including headache, seizure, and/or focal neurologic deficits
- For concerns related to stroke, see **Stroke/TIA HD-21.1**
- 3D imaging (CPT® 76376 or CPT® 76377) with MRI Brain without and with contrast (CPT® 70553) OR MRI Brain without contrast (CPT® 70551) is considered medically necessary.
- 3D Rendering (CPT® 76377 or CPT® 76376) with cervicocerebral catheter angiography is considered medically necessary to define the presence, location, and anatomy of intracranial and cervical vascular malformations at diagnosis and for follow up, including post-treatment, (see **General Guidelines - Other Imaging Situations (HD-1.7)** and **Background and Supporting Information**).
- See **General Guidelines – CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5)**
- Functional MRI (CPT® 70554 OR CPT® 70555) for surgical planning, see **Functional MRI (fMRI) (HD-24.2)**

Background and Supporting Information

- Trauma is the most common reason for subarachnoid hemorrhage. Ruptured berry aneurysm is the most common reason for non-traumatic subarachnoid hemorrhage in adults.
- Small aneurysms are present in about 1% to 2% of adults, but very few ever reach a size for which bleeding is a risk (>5 mm). Small (<3 mm to 4 mm) unruptured aneurysms in those with no personal history of SAH have a 0.1% to 0.5% a year rate of bleeding. The risk of cerebral aneurysm with family history ranges from 2% with one first-degree relative to 30% to 35% for identical twin or two parents. The risks and benefits of screening these populations need to be considered before advanced imaging.
- AVMs most often come to clinical notice either by bleeding or by acting as a seizure focus. They are usually congenital, recognized later in life and have an initial risk of bleeding of 2% per year.
- Cerebral angiography is a form of angiography which provides images of blood vessels in and around the brain and/or neck. This is a catheter-based procedure, using x-ray imaging guidance and iodine-based contrast to visualize blood vessels.
- Most intracranial AVMs are congenital, vary widely in their location and type, and are discovered at birth due to associated clinical findings or incidentally later in life. Certain hereditary conditions are associated with an increased risk for AVM development.

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- Vascular malformations include arteriovenous, venous, cavernous, and capillary malformations.
- Hereditary AVMs usually have an autosomal dominant pattern of inheritance.

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Evidence Discussion (HD-12)

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- After the initial identification of a subarachnoid hemorrhage, the search for a ruptured cerebral aneurysm begins with imaging of the cerebral vessels with CT Angiography (CTA), MR Angiography (MRA) or diagnostic cervicocerebral catheter angiography (Ledbetter et al., 2021).
- CTA Head has over 90% sensitivity and specificity for the diagnosis of cerebral aneurysm in the setting of subarachnoid hemorrhage (Ledbetter et al., 2021).
- MRA Head has a sensitivity of 95% and a specificity of 89% for diagnosis of cerebral aneurysm (Ledbetter et al., 2021).
- Diagnostic cervicocerebral catheter angiography has the highest spatial and temporal resolution of any vascular imaging study; however, is invasive and requires use of contrast. It has a sensitivity and specificity over 98% for identification of aneurysm and can also diagnose vascular abnormalities in up to 13% with subarachnoid hemorrhage and a negative CTA. In addition, this modality can identify an aneurysm in 25% of previously negative studies and repeat studies are supported for this reason (Ledbetter et al., 2021).
- In select cases of subarachnoid hemorrhage when an intracranial aneurysm is not identified, imaging the neck vessels and spinal vessels is appropriate (Samela et al., 2017).
- Aneurysm growth ranges from 4% to 14% on follow up imaging. For surveillance of incidentally identified cerebral aneurysms or ruptured and/or treated aneurysms, the less invasive modalities, CTA and/or MRA are supported, over the more invasive diagnostic cervicocerebral angiography (Ledbetter et al., 2021).
- Screening for cerebral aneurysms in high-risk individual populations is also recommended with the less invasive modalities, CTA Head or MRA Head. This includes individuals with autosomal dominant polycystic kidney disease (ADPKD), who had a prevalence of cerebral aneurysm ranging from 10%-11.5%. The American Heart Association recommended screening those with at least 2 family members with cerebral aneurysm or subarachnoid hemorrhage (Ledbetter et al., 2021).
- Screening is also recommended for conditions with known increased risk of cerebral aneurysm (Thompson et al., 2015; Ledbetter et al., 2021).
- Although vascular imaging is the primary focus of neuroimaging in the diagnosis and follow up of cerebral aneurysms, parenchymal imaging with MRI Brain may be helpful in select clinical scenarios including giant aneurysms, posterior fossa aneurysms, in the setting of cranial neuropathies or focal neurologic findings and suspected stroke (Salmela et al., 2017).
- Cervicocerebral angiography is the gold standard for imaging arteriovenous malformations (AVM) and arteriovenous fistulas (AVF). CT Angiography head (CTA) has a 90% sensitivity for the overall detection of AVMs and 100% for AVMs >3 cm

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in size. In the evaluation of pulsatile tinnitus, CTA has a sensitivity of 86% with a specificity of 100% in identifying high flow AVFs. MR Angiography (MRA) is an alternative modality in these scenarios (Ledbetter et al., 2021).

- MRI Brain for diagnosis and follow up of AVM has an overall sensitivity of 89% and 100% for lesions >3 cm in size (Ledbetter et al., 2021).

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Head and Facial Trauma (HD-13)

Guideline

Head Trauma (HD-13.1)
Facial Trauma (HD-13.2)
Evidence Discussion (HD-13)
References (HD-13)

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Head Trauma (HD-13.1)

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Criteria

For acute head trauma (0 to 7 days post-trauma)

- CT Head without contrast (CPT® 70450) is considered medically necessary in individuals with **ANY** of the following modified Canadian CT Head Rule/New Orleans Criteria.
  - Regardless of documented or stated head impact, ANY "dangerous mechanism of injury", either direct or indirect, including, but not exclusive to:
    - Fall from height greater than 3 feet
    - Fall greater than 5 steps down stairs
    - Any pedestrian motor vehicle accident
    - High impact motor vehicle accident
  - Individuals 60 years of age or older
  - Loss of consciousness, amnesia, or disorientation accompanying blunt head trauma within 24 hours
  - Taking one anticoagulant or two antiaggregants, (e.g., aspirin and Plavix)
  - Known platelet or clotting disorder
  - Glasgow coma scale (GCS) score of less than 15 at 2 hours following injury
  - >30 minutes of amnesia before impact
  - Suspected open skull fracture
  - Signs of basilar skull fracture (Battle's sign, Raccoon eyes, CSF rhinorrhea, cranial nerve palsy, hemotympanum, acute hearing loss)
  - Vomiting
  - Alcohol or drug intoxication
  - Visible trauma above clavicles
  - Deficits in short term memory, altered level of alertness, abnormal behavior, or focal neurological deficit
  - Seizure
  - Headache, see **Headache Associated with Head Trauma (HD-11.12))**

For subacute head trauma (7 days to 3 months post-trauma) and chronic head trauma (greater than 3 months post-trauma) symptoms

- MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is considered medically necessary for the initial imaging of individuals with subacute or chronic head trauma and unexplained cognitive or neurologic deficits.

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- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary if post-traumatic infection is suspected.

Repeat and follow-up imaging

- Follow-up imaging is considered medically necessary for known subdural hematomas, intracerebral hemorrhage, or contusions can be done at the discretion of the ordering provider with one of the following:
  - MRI Brain without and with contrast (CPT® 70553) **OR**
  - MRI Brain without contrast (CPT® 70551) **OR**
  - CT Head without and with contrast (CPT® 70470) **OR**
  - CT Head without contrast (CPT® 70450)
- For short term follow-up imaging of acute traumatic brain injury (TBI) without neurologic deterioration, CT Head without contrast (CPT® 70450) is considered medically necessary in individuals with ANY of the following risk factors:
  - subfrontal/temporal intraparenchymal contusions
  - anticoagulation
  - age over 65 years
  - intracranial hemorrhage
- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary as a complementary study when neurological findings or symptoms are not sufficiently explained by CT or in subacute and chronic TBI for new, persistent, or slowly progressive symptoms.

For suspected intracranial venous or arterial injury, the following is considered medically necessary:

- CTA/CTV Head (CPT® 70496) or MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546)
  - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures (see **General Guidelines - CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5))**

SPECT, PET, CT/MRI perfusion, diffusion tensor imaging (DTI) , functional MRI, and MR spectroscopy are considered not medically necessary for the evaluation of traumatic brain injury.

Quantitative Magnetic Resonance Image (MRI) Analysis of the Brain

- Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be requested as (CPT® 0865T or CPT® 0866T)
  - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered not medically necessary in the evaluation of traumatic brain injury.

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AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T

- These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.

See **Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma (SP-3.2)** in the Spine Imaging Guidelines

See **General Guidelines – CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5)** for traumatic vascular injuries

Background and Supporting Information

Individuals with head trauma are at risk for facial and cervical trauma.

Recent studies have shown that diffusion tensor MRI tractography may be more sensitive in demonstrating abnormalities such as axonal injury in closed head injury than conventional MRI, but these techniques are best described presently as research tools and their use in clinical practice is not determined.

Decisions regarding return to normal activities, including sports, are made based on the clinical status of the individual and repeat imaging is medically unnecessary.

In cases of post-traumatic infection, contrast-enhanced MRI or CT may be helpful.

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Facial Trauma (HD-13.2)

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Criteria

- CT Maxillofacial without contrast (CPT® 70486) and/or CT Head without contrast (CPT® 70450) is/are considered medically necessary for any concern regarding significant injury to facial structures including, but not limited to:
  - Concern for orbital, maxillary, or mandibular fractures
  - Trauma with associated symptoms of anosmia, hearing, vision or speech changes, vertigo, facial numbness
  - Physical exam findings of CSF rhinorrhea (suspected post-traumatic CSF leak), malocclusion, severe focal facial tenderness, focal loss of facial sensation
- CT Orbits/Temporal Bone without contrast (CPT® 70480) and/or CT Head without contrast (CPT® 70450) is/are considered medically necessary for:
  - concern for orbital injury or orbital wall fracture
  - symptoms of diplopia, blurred vision, vision loss
  - physical exam findings of enophthalmos, entrapment of extraocular muscle(s)
  - suspicion for temporal bone fracture
  - physical exam findings of CSF otorrhea (suspected post-traumatic CSF leak)
- MRI Maxillofacial without contrast (CPT® 70540) **OR** MRI Maxillofacial without and with contrast (CPT® 70543) is considered medically necessary for evaluation of cranial nerve deficits not explained or incompletely characterized on CT.
- If concern for CSF leak and CT Maxillofacial or Temporal bone is inconclusive, (see **Low-Pressure Headache and CSF Leak (HD-11.15)**)

Background and Supporting Information

Imaging is not necessary in the evaluation of simple nasal fractures if tenderness and swelling is limited to the nasal bridge, the individual can breathe through each naris, and there is no septal hematoma.

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Evidence Discussion (HD-13)

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- For evaluation of acute mild head trauma, less than 10% will have positive findings on CT head, and of this group, less than 1% will require neurosurgical intervention (Shih et al., 2021; Smits et al., 2005).
- The American College of Emergency Physicians and the Choosing Wisely Initiative recommend avoiding CT scans of the head in emergency department individuals with minor head injury who are at low risk based on validated decision rules. This recommendation was based on the concern for individual exposure to ionizing radiation and the increased lifetime risk of cancer with such exposure (Valente et al., 2023).
- Selective CT scanning is recommended by validated clinical practice guidelines, including the New Orleans Criteria and the Canadian CT Head Rule (Steill et al., 2001; Shih et al., 2021; Smits et al., 2005). Both guidelines are 100% sensitive for mild head trauma requiring neurosurgical intervention (Shih et al., 2021; Smits et al., 2005). The New Orleans Criteria has a sensitivity greater than 97% for any traumatic finding on CT, with a specificity less than 6%. (Shih et al. 2021). The Canadian CT Head Rule has a sensitivity between 83.4% - 87.2% with a specificity between 37.2% – 39.7%. Steill et al., 2001; Shih et al., 2021; Smits et al., 2005). The Canadian CT Head Rule has a 100% sensitivity and 29% specificity in cases of intracranial hemorrhage (Steill et al., 2001; Shih et al., 2021; Smits et al., 2005).
- When imaging is indicated by a validated clinical decision rule, CT Head is the preferred imaging modality for evaluation of acute head trauma (Shih et al., 2021; ACR, 2021; Valente et al., 2023; Smits et al., 2005).
- If the initial CT head confirms subdural hematoma, follow-up CT head is supported to monitor progression (Shih et al., 2021; Wintermark et al., 2015).
- For follow-up in individuals with persistent neurologic deficits without etiology identified on initial CT Head, MRI Brain is more sensitive, and can visualize cortical contusions, subdural hematomas, and white matter lesions in diffuse axonal injury (Shih et al., 2021). Up to 27% of individuals with mild traumatic brain injury (TBI) with normal initial CT Head show abnormalities on MRI Brain (Shih et al., 2021; Wintermark et al., 2015).
- When vascular injury is suspected in the setting of head trauma, CT Angiography (CTA) Head and Neck is a non-invasive, rapid, and useful modality to evaluate for arterial injury.7,1 MR Angiography is an alternative option. For suspected intracranial venous injury, CT Venography (CTV) is considered medically necessary, with MR Venography (MRV) an alternative option (Shih et al., 2021; Parsons et al., 2022).
- There is insufficient evidence to support the use of single-photon emission computed tomography (SPECT), FDG-PET/CT Brain, CT/MRI-Perfusion, MR spectroscopy

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(MRS), functional MRI (fMRI), or diffusion tensor imaging (DTI) in the evaluation of head trauma (Shih et al., 2021).

- Individuals with head trauma are also at risk for orbital, facial and temporal bone injuries.(Kennedy 2018) CT of the orbit can diagnose fractures, displaced fracture fragments, foreign bodies, traumatic hematoma, and extraocular muscle injury (Kennedy et al., 2018). CT Head is also recommended in the evaluation of suspected orbital fractures due to concomitant intracranial injury incidence of 9% (Parsons et al., 2022).
- CT Maxillofacial is useful in diagnosing maxillofacial injuries including non-displaced fractures. CT provides multiplanar and 3D image reconstructions, allowing for better characterization of complex fractures, which is useful for surgical planning (Parsons et al., 2022).
- Over one-third of individuals with frontal sinus fractures are likely to have a concomitant intracranial injury, thus concurrent CT Head imaging is recommended in individuals with suspected frontal sinus fractures. In addition, between 8% to 10% of individuals with frontal sinus fractures have subdural or epidural hematomas requiring surgical treatment (Parsons et al., 2022).
- High resolution CT (HRCT) facial and temporal bone are sensitive modalities for subtle or non-displaced skull base defects, with sensitivity of 92% for identifying cerebrospinal fluid leak (Shih et al., 2021, ACR, 2021).

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CNS and Head Infection/ Neuro-COVID-19 (HD-14)

Guideline

CNS and Head Infection (HD-14.1)
Neuro-COVID-19 and Sars-CoV-2 Vaccines (HD-14.2)
Autoimmune/Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD-14.3)
References (HD-14)

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CNS and Head Infection (HD-14.1)

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Criteria

INITIAL IMAGING

- Signs of intracranial infection include, but are not limited to:
  - headaches, seizures, meningeal signs (neck stiffness)
  - new focal neurological deficits in a setting of fever or elevated white blood cell count (WBC)
  - known infection elsewhere **or**
  - immunosuppression
- **ONE** of the following studies is considered medically necessary for suspected intracranial infection if any of these signs of infection are present:
  - MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) **OR**
  - CT Head (CPT® 70450, CPT® 70460, or CPT® 70470) in cases where MRI is contraindicated, in urgent scenarios, or prior to lumbar puncture, see **General Guidelines-CT Head (HD-1.4)**
  - If vascular involvement is suspected, in addition to MRI Brain, the following are considered medically necessary:
    - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR**
    - CTA Head (CPT® 70496) **AND/OR**
    - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR**
    - CTA Neck (CPT® 70498) **OR**
    - CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
    - (CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography)
  - Concern for vasculitis, see **Cerebral Vasculitis (HD-22)**

REPEAT IMAGING

- As requested by an infectious disease specialist, neurologist, neurosurgeon, radiologist, or any provider coordinating care with an infectious disease specialist, neurologist, neurosurgeon, or radiologist
- Repeat imaging would refer to any of the CPT codes listed above as initial imaging.

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- See **General Guidelines – CT Head (HD-1.4)** regarding additional indications for CT Head.
- See **Skull Base Osteomyelitis (SBO) (HD-20.1)**, **Sinus and Facial Imaging (HD-29.1)**, **Dental/Periodontal/Maxillofacial Imaging (HD-30.2)**, **Mental Status Change (HD-4.2)**, and **Eye Disorders and Visual Loss (HD-32.1)**

Evidence Discussion (HD-14.1)

- A head CT is recommended for quickly assessing intracranial infections in urgent cases. However, MRI is more effective for examining conditions that affect the cranial nerves, brain tissue, and meninges.(ACR 2020) Although MRI is superior in detecting minor changes in the brain associated with infections, CT scans can promptly identify pathophysiological changes that may influence the individual's prognosis (Abdalkader et al., 2019).
- Acute bacterial meningitis often presents with a normal CT scan. However, due to the high mortality rate of up to 50% when left untreated, a CT scan is necessary to rule out other causes of encephalopathy or neurologic deficits. In certain clinical situations, CT is also required to exclude increased intracranial pressure before performing a lumbar puncture. Venous thromboses increase the risk of hemorrhage and are linked to high mortality. Consequently, both CT and MRI scans, including T1-weighted sequences, are recommended. These scans help detect high signal changes in several venous sinuses and can be complemented with CT or MR venography.
- Similar considerations apply when diagnosing non-bacterial central nervous system (CNS) infections. CT scans are advantageous due to quick access to care, faster diagnosis, and earlier treatment initiation, which can reduce morbidity. However, MRI is superior in detecting patterns of vasogenic versus cytotoxic edema, contrast enhancement, and the distribution of involvement, whether multifocal or unifocal/ unihemispheric. These distinctions are crucial in differentiating between differential diagnoses, such as systemic infections with hematogenous spread versus head/neck infections with a direct spread pattern (Nguyen et al., 2020).
- Many individuals present with neurologic signs and symptoms that are indicative of either a cortical or subcortical syndrome. Often, these cannot be fully characterized by clinical presentation alone. As a result, radiologic evaluation becomes essential in diagnosing the etiology of the underlying process. The potential causes are varied and include meningoencephalitis, acute cerebrovascular disease, hemorrhagic necrotizing encephalopathy, immune-mediated (Bickerstaff) encephalitis, and demyelinating diseases such as acute disseminated encephalomyelitis (ADEM) and multiple sclerosis (MS) (Sklinda et al., 2021). Therefore, prompt and accurate diagnosis is critical to select the most appropriate imaging method (MRI vs. CT) for each clinical scenario.

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Neuro-COVID-19 and Sars-CoV-2 Vaccines (HD-14.2)

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Criteria

- The following studies are considered medically necessary for evaluation of:
  - Acute or chronic Neuro-COVID-19 syndrome
    - MRI Brain without contrast (CPT® 70551) **OR**
    - MRI Brain without and with contrast (CPT® 70553) **OR**
    - CT Head without contrast (CPT® 70450) **OR**
    - CT Head without and with contrast (CPT® 70470) is considered medically necessary if there is a contraindication to MRI **AND/OR**
    - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) OR CTA Head (CPT® 70496) **AND/OR**
    - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498)
      - CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
    - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography):
      - If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code is used to report both procedures
      - If an arterial CTA or MRA study has been performed and subsequently a repeat study is needed to evaluate the venous anatomy, then this study is considered medically necessary
      - If a venous CTV or MRV has been performed and subsequently a repeat study is needed to evaluate the arterial anatomy, then this study is considered medically necessary
      - MRA without and with contrast with venous sinus thrombosis to differentiate total from subtotal occlusion is considered medically necessary
  - For suspected neurologic adverse reactions after SARS- CoV-2 vaccination, the following is considered medically necessary:
    - MRI Brain without contrast (CPT® 70551) **OR**
    - MRI Brain without and with contrast (CPT® 70553) **OR**
    - CT Head without contrast (CPT® 70450) **OR**

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- CT Head without and with contrast (CPT® 70470) is considered medically necessary if there is a contraindication to MRI **AND/OR**
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) OR CTA Head (CPT® 70496) **AND/OR**
- MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70498)
  - CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
- CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography):
  - If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code is used to report both procedures
  - If an arterial CTA or MRA study has been performed and subsequently a repeat study is needed to evaluate the venous anatomy, then this study is considered medically necessary
  - If a venous CTV or MRV has been performed and subsequently a repeat study is needed to evaluate the arterial anatomy, then this study is considered medically necessary
  - MRA without and with contrast with venous sinus thrombosis to differentiate total from subtotal occlusion is considered medically necessary

◦ If suspected transverse myelitis, acute necrotizing myelitis, and/or COVID-19 infection, then **ANY** the following are considered medically necessary:
- MRI Cervical without and with contrast (CPT® 72156)
- MRI Thoracic without and with contrast (CPT® 72157)
- MRI Lumbar Spine without and with contrast (CPT® 72158)
- See **Stroke/TIA (HD-21.1)** for vascular imaging
- See **Transverse Myelitis (HD-16.4)** regarding spine imaging to evaluate for post-vaccination neurological syndrome

- Repeat imaging considered on a case-by-case basis for a change in neurological symptoms or signs on the neurological exam and/or change in the treatment.

Background and Supporting Information

- The findings observed in the central nervous system in the acute-phase of COVID-19 may extend into a prolonged symptomatic phase of Neuro-COVID in long haulers with chronic COVID syndrome. Symptoms may include, but are not inclusive to: "brain fog", dizziness, inability to concentrate, psychiatric symptoms, and confusion.
- Acute-phase neurologic manifestations of COVID-19 include: headache, dizziness, taste and smell dysfunction, impaired consciousness (described as confusion or agitation), cerebrovascular events (ischemic stroke, cerebral venous sinus thrombosis, cerebral hemorrhage), seizures, meningoencephalitis, and immune-

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mediated neurologic diseases (Guillan-Barre syndrome, Miller-Fisher syndrome, polyneuritis cranialis, transverse myelitis).

- Neurologic adverse reactions in those receiving SARS-CoV-2 vaccines, including mRNA vaccines (Pfizer, Moderna), have been reported, and include, although not limited to: headache, Guillan-Barre syndrome, transverse myelitis, facial nerve palsy, small fiber neuropathy, autoimmune encephalitis, reversible cerebral vasoconstriction syndrome, multiple sclerosis, neuromyelitis optica, intracerebral bleeding, cerebral venous sinus thrombosis, hypophysitis, epilepsy, encephalopathy, and acute disseminated encephalomyelitis.
- Cases of Thrombosis with Thrombocytopenia Syndrome (TTS) following administration of the Johnson & Johnson/Janssen COVID-19 Vaccine have been reported in males and females, in a wide age range of individuals 18 years and older, with the highest reporting rate (approximately 8 cases per 1,000,000 doses administered) in females ages 30-49 years; overall, approximately 15% of TTS cases have been fatal. Currently available evidence supports a causal relationship between TTS and the Johnson & Johnson/Janssen COVID-19 Vaccine. The clinical course of these events shares features with autoimmune heparin-induced thrombocytopenia. In individuals with suspected TTS following administration of the Johnson & Johnson/Janssen COVID-19 Vaccine, the use of heparin may be harmful and alternative treatments may be needed. Consultation with hematology specialists is strongly recommended. The American Society of Hematology has published considerations relevant to the diagnosis and treatment of TTS following administration of the Janssen COVID-19 Vaccine.

Evidence Discussion (HD-14.2)

- A head CT is recommended for quickly assessing intracranial infections in urgent cases. However, MRI is more effective for examining conditions that affect the cranial nerves, brain tissue, and meninges.(ACR 2020) Although MRI is superior in detecting minor changes in the brain associated with infections, CT scans can promptly identify pathophysiological changes that may influence the individual's prognosis (Abdalkader et al., 2019).
- Acute bacterial meningitis often presents with a normal CT scan. However, due to the high mortality rate of up to 50% when left untreated, a CT scan is necessary to rule out other causes of encephalopathy or neurologic deficits. In certain clinical situations, CT is also required to exclude increased intracranial pressure before performing a lumbar puncture. Venous thromboses increase the risk of hemorrhage and are linked to high mortality. Consequently, both CT and MRI scans, including T1-weighted sequences, are recommended. These scans help detect high signal changes in several venous sinuses and can be complemented with CT- or MR-venography.
- Similar considerations apply when diagnosing non-bacterial central nervous system (CNS) infections. CT scans are advantageous due to quick access to care, faster

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diagnosis, and earlier treatment initiation, which can reduce morbidity. However, MRI is superior in detecting patterns of vasogenic versus cytotoxic edema, contrast enhancement, and the distribution of involvement, whether multifocal or unifocal/unihemispheric. These distinctions are crucial in differentiating between differential diagnoses, such as systemic infections with hematogenous spread versus head/neck infections with a direct spread pattern (Nguyen et al., 2019).

- Many individuals present with neurologic signs and symptoms that are indicative of either a cortical or subcortical syndrome. Often, these cannot be fully characterized by clinical presentation alone. As a result, radiologic evaluation becomes essential in diagnosing the etiology of the underlying process. The potential causes are varied and include meningoencephalitis, acute cerebrovascular disease, hemorrhagic necrotizing encephalopathy, immune-mediated (Bickerstaff) encephalitis, and demyelinating diseases such as acute disseminated encephalomyelitis (ADEM) and multiple sclerosis (MS) (Sklinda et al.,2021). Therefore, prompt and accurate diagnosis is critical to select the most appropriate imaging method (MRI vs. CT) for each clinical scenario.

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Autoimmune/Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD-14.3)

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Criteria

Indications:

When acute/subacute or rapid progression (under 3 months) of altered mental status, focal findings including cranial nerve, motor or sensory symptoms or memory loss or psychiatric symptoms, seizure, and/or focal CNS findings are present.

OR

There is a stated concern for neuro-inflammatory encephalitis from or in consultation with a neurologist, neurosurgeon, psychiatrist, oncologist, rheumatologist, or infectious disease specialist.

Medically Necessary Initial Imaging:

- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) **OR**
- CT Head without contrast (CPT® 70450) **OR** CT Head without and with contrast (CPT® 70470) when MRI is unavailable or contraindicated or for bony pathology concerns
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** CTA Head (CPT® 70496) **AND/OR** MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR** CTA Neck (CPT® 70498)
  - CTA Head and Neck (CPT ® 70471) must be submitted if performed during the same session

  The above imaging studies are for evaluating large vessel obstructions, aneurysms and vascular malformations, dissection, vasospasm, and vasculopathies such as CNS vasculitis (see **Cerebral Vasculitis (HD-22.1)**, **Cerebral Aneurysms (HD-12.1)**, **Arteriovenous Malformations (AVMs) and Related Lesions (HD-12.2)**, **Stroke/TIA (HD-21.1)**)

Medically Necessary Repeat Imaging:

MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) when specialized sequences are needed such as, but not limited to:

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- high T2 contrast sequences (CISS, FIESTA) sequences to identify blood (SWI) or
- identifying acute cytotoxic edema (DWI) or
- when requested by or in consultation with a neurologist, oncologist, rheumatologist, infectious disease specialist, neurosurgeon, or psychiatrist

Metabolic (FDG) Brain PET (CPT® 78608) is considered medically necessary to evaluate individuals suspected of having encephalitis, including autoimmune encephalitis, if diagnosis remains unclear after evaluation with MRI Brain, CSF analysis, and/or lab testing including serology.

Neurosarcoidosis:

- The following are considered medically necessary for known or suspected neurosarcoidosis.
  - MRI Brain without and with contrast (CPT® 70553)

    AND/OR
  - If spinal cord involvement suspected, then
    - MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR**
    - MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR**
    - MRI Lumbar Spine without and with contrast (CPT® 72158)

    AND/OR
  - If peri-orbital involvement suspected, then
    - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
  - Repeat imaging supported if requested by neurologist, rheumatologist, ophthalmologist, oncologist, or radiologist or provider in consultation with a neurologist, rheumatologist, ophthalmologist, oncologist or radiologist.
- For non-neurologic imaging related to sarcoidosis (see **Sarcoid (CH-15.1)**)

Background and Supporting Information

Supportive studies in the evaluation of Autoimmune/Paraneoplastic Encephalopathy include:

- CSF pleocytosis (>5 WBC/µL) or
- EEG changes or
- Supporting labs (including positive CSF antibody positivity and/or serologies)

Potential etiologies:

- Paraneoplastic
  - NMDA Receptor encephalitis
  - LGI1 antibody encephalitis
- Autoimmune

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  - Neurosarcoidosis can involve any of the following:
    - Brain, cranial nerves, spinal cord, and/or peripheral nerves
    - Acute Disseminated Encephalomyelitis (ADEM), Anti-MOG Syndrome, Multiple Sclerosis (MS), Neuromyelitis Optica (NMO)
    - IgG4 related disease
    - CNS histiocytosis
- Neuro-rheumatologic
  - ANCA related disease
  - Behcet's disease
  - Sjogren Syndrome +/- Rheumatoid Arthritis (RA)

FDG-PET imaging of the brain for paraneoplastic and autoimmune encephalitis may be more sensitive than brain MRI (87% vs. 56%) but is nonspecific. Areas of hypometabolism are seen in neurodegenerative disorders such as dementias. However, topographic patterns of hypometabolism may help characterize the disorder as autoimmune/ paraneoplastic encephalitis, in a way that may help clarify diagnosis and alter management strategies. For example, anterior to posterior gradient of hypometabolism is seen in NMDA Receptor encephalitis. Hemispheric hypometabolism out of proportion to atrophy characterizes Rasmussen encephalitis.

Non-Head Imaging

- MRI is helpful in determining the length of spine lesion (short versus longitudinally extensive transverse myelitis), width (partial versus transverse), and location (eccentric, central, hemicord, anterior versus posterior, conus, tracts, or meningeal).
  - See **Myelopathy (SP-7.1)** and **Anti-MOG Syndromes (HD-16.3)**
- The Trident Sign on axial MRI, which has been described in relation to neurosarcoidosis, demonstrates leptomeningeal or dorsal subpial enhancement that may or may not involve the central canal.
  - See **Myelopathy (SP-7.1)**
- Involvement of the conus medullaris is a clue to Anti-MOG (Myelin Oligodendrocyte Glycoprotein-associated disorder) as the cause of longitudinally extensive transverse myelitis.
  - See **Transverse Myelitis (HD-16.4)**
- CT of the chest, abdomen, and pelvis with contrast is a generally accepted first method of screening for occult malignancy or systemic inflammation (e.g., sarcoidosis).
  - See **Paraneoplastic Syndromes (ONC-30.3)** and **Sarcoid (CH-15.1)**

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Evidence Discussion (HD-14.3)

- The American College of Radiology (ACR) Appropriateness Criteria® provided guidance on the appropriateness of CT versus MRI Brain in certain clinical scenarios relating to altered mental status. For acute, undifferentiated presentations and with focal symptoms, CT Head is an appropriate modality, but with known intracranial process, suspected medical illness or toxic-metabolic etiology, and/or psychosis, MRI Brain, is appropriate and in some cases may be preferable (Expert Panel on Neurological Imaging et al., 2024).
- In the appropriate clinical scenarios, recognition of structural and functional imaging patterns of brain involvement using CT Head, MRI Brain, and brain PET, in autoimmune encephalitis (including paraneoplastic and non-rheumatologic inflammatory disorders) can facilitate rapid access to appropriate treatment, as well as avoid invasive diagnostic procedures such as brain biopsy (Wahed & Cho, 2023).
- FDG-PET/CT Brain performed at a median 4 weeks of symptom onset was more often abnormal than initial MRI, EEG, or laboratory cerebrospinal fluid testing, in individuals with suspected autoimmune encephalitis (AE), with focal hypometabolism, the most common PET/CT finding (Probasco et al., 2017).
- Spine MRI shows abnormalities in up to 45% of cases of paraneoplastic myeloneuropathy (Shah et al., 2020).
- The three-dimensional (3D) constructive interference in steady state (CISS) is a gradient-echo MRI or Fast Imaging Employing Steady-state Acquisition Cycled Phases (FIESTA-C) on GE MRI systems are widely employed for over a decade and have been shown to have utility in demonstration of contrast between cerebrospinal fluid and brain parenchymal structure. Therefore, these have particular utility in the examination of cranial nerves, the ventricular system, cavernous sinus, and other structures which are commonly involved in neuro-inflammatory conditions (Hingwala et al., 2011).
- Neuropsychiatric lupus and other neuro-inflammatory conditions have been described to mimic vascular disease, such as vasculitis and small vessel cerebrovascular disease, and in these cases vessel imaging with CT Angiography (CTA) and MR Angiography (MRA) Brain can contribute to meaningful diagnosis (Lancaster, 2016).
- In the evaluation of a first episode of psychosis when an autoimmune cause is suspected, up to 4% of cases have abnormalities on MRI brain (Guasp et al., 2021).
- Sarcoidosis can manifest with neurologic complications in every part of the neural axis, with diagnostic challenges represented by multiple pathophysiologic pathways and frequently lack of specific histopathologic diagnosis. In clinically suspected neurosarcoidosis on the basis of synthesized clinical history and physical examination findings, the demonstration of neuro-inflammation using cerebrospinal fluid testing and contrast-enhanced MRI is useful. In difficult or complicated cases, FDG-PET and Gallium-67 imaging have been useful for identification of targets for biopsy (Stern et al., 2018).

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Movement Disorders (HD-15)

Guideline

Movement Disorders (HD-15.1)
References (HD-15)

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Movement Disorders (HD-15.1)

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Criteria

- The majority of movement disorders are diagnosed based on a clinical diagnosis and imaging is not considered medically necessary. These include:
  - typical Parkinson's Disease
  - essential tremor or tremors of anxiety or weakness
  - restless leg syndrome
  - tics or spasms which can be duplicated at will
  - Tourette syndrome
  - tardive dyskinesia
- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary in the following clinical scenarios:
  - Clinical diagnostic uncertainty
  - Incomplete or uncertain response to medication
  - Anti-psychotic drug-induced Parkinsonism or atypical tardive dyskinesia
  - Atypical Parkinsonism suspected because of unusual clinical features. These may include, but are not limited to:
    - Persistent unilateral signs or symptoms
    - Onset under age 50
    - Rapid progression
    - See *Background and Supporting Information* for further information on atypical parkinsonism and Parkinson's Plus Syndromes
  - Suspected Huntington's Disease
- Evaluation for surgical treatment of essential tremor, Parkinson's disease, and/or spasmodic torticollis/dystonia, see **Torticollis and Dystonia (Neck-10.2)** in the Neck Imaging Guidelines
  - Deep Brain Stimulation (DBS) therapy
    - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR** unlisted CT procedure code (CPT® 76497) are considered medically necessary
  - MR guided Focused Ultrasound:
    - CT Head without contrast (CPT® 70450) to evaluate bone density **AND/OR** MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) are considered medically necessary

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  - Repeat imaging studies for pre-surgical evaluation, MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR** CT Head without contrast (CPT® 70450), are considered medically necessary when ordered by a neurosurgeon or neurologist or any provider in consultation with a neurosurgeon or neurologist if greater than 6 months old **and/or** for new symptoms/signs
  - Post-op imaging is considered medically necessary when ordered by a neurosurgeon or neurologist or any provider in consultation with a Neurosurgeon or Neurologist for either procedure, see also **Post-Operative Imaging (HD-28.3)** indications
- Dopamine Transporter Scan [DAT-SPECT Radiopharmaceutical Localization SPECT (Ioflupane I-123 SPECT)] (CPT® 78803 or CPT® 78830) **OR** Fluorodopa F^{18} (F-DOPA) PET Brain (CPT® 78814) is considered medically necessary to (Thaler & Alacay 2022, Maiti & Perlmutter 2023, Fluorodopa F18 Injection Package Insert, Dhawan et al. 2022, Morbelli et al. 2020):
  - evaluate motor symptoms (tremor, rigidity, bradykinesia, and/or postural instability) in suspected Parkinsonian Syndromes (Parkinson Disease, Multiple System Atrophy, Progressive Supranuclear Palsy, Corticobasal Degeneration) when the diagnosis is unclear, to differentiate from non-neurodegenerative disorders, such as Essential Tremor, drug-induced tremor, vascular parkinsonism, and/or psychogenic tremor
  - Imaging with either modality, **not both**, is considered medically necessary when the diagnosis remains unclear after evaluation by a neurologist, medication trials and brain imaging.
  - See *Background and Supporting Information* for additional information regarding Parkinson's Plus Syndromes.
  - Neither DAT Scans nor F-DOPA PET scans are considered medically necessary for differentiation of subtypes of Parkinson's syndromes, to monitor progression of disease, or predict risk of development of disease mainly to exclude other conditions with similar clinical presentations.
- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for initial imaging for suspected motor neuron disease (see **Motor Neuron Disease/ Amyotrophic Lateral Sclerosis (ALS) (PND-8.1)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guideline)
- Dementia associated with movement disorder (see **Lewy Body Dementia (LBD) – SPECT Brain Scan and PET (HD-8.3))**

Background and Supporting Information

- Parkinson's Plus Syndromes are a group of disorders characterized by atypical parkinsonism. They are NOT Parkinson's disease. They represent different

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neurodegenerative diseases with features of PD, and may be confused with PD. These syndromes include, but are not limited to:
  - Multiple system atrophy: orthostatic hypotension (dysautonomia), dysphonia, dysarthria
  - Progressive Supranuclear Palsy: balance difficulties, vertical gaze paresis
  - Corticobasal Syndrome: dysphasia, apraxia, myoclonus, alien-limb phenomenon
- These are distinct entities. Care must be taken to determine if there are unusual features present that will suggest atypical parkinsonian syndrome.
- Dementia with Lewy bodies (DLB): dementia prior to movement disorder (see **Lewy Body Dementia (LBD) - SPECT Brain Scan and PET (HD-8.3)**)

Evidence Discussion (HD-15)

- The majority of movement disorders are diagnosed based on history and clinical examination findings and do not require imaging (Expert Panel on Neurological Imaging et al., 2020; Thaler & Alcalay, 2022; Maiti & Perlmutter, 2023; Politis, 2014). For cases of diagnostic uncertainty, incomplete response to medication, for atypical Parkinsonism or drug-induced parkinsonism, and for suspected Huntington disease, MRI Brain is the preferred imaging modality (Expert Panel on Neurological Imaging et al., 2020; Maiti & Perlmutter, 2023; Politis 2014).
- Structural imaging with MRI Brain is usually normal in individuals with Parkinson's disease but is useful to diagnose causes of secondary parkinsonism, such as stroke, iron deposition, normal pressure hydrocephalus, and neoplasm (Expert Panel on Neurological Imaging et al., 2020; Thaler & Alcalay, 2022; Maiti & Perlmutter, 2023).
- CT Head is not preferred due to its limited soft-tissue characterization when compared to MRI.(Harvey 2020)
- Functional imaging studies assessing dopaminergic function in Parkinson's disease include single-photon emission computed tomography (SPECT) and positron emission tomography (PET) imaging. These studies are used as an adjunct diagnostic test (Expert Panel on Neurological Imaging et al., 2020; Thaler & Alcalay, 2022; Maiti & Perlmutter, 2023).
- Both Dopamine Transporter single-photon emission computed tomography (DAT-SPECT) and [18F]-fluorodopa (F-DOPA) PET brain are useful to differentiate suspected parkinsonian syndromes from non-neurodegenerative disorders such as Essential Tremor, drug-induced tremors, vascular parkinsonism, and/or psychogenic tremors (Expert Panel on Neurological Imaging et al., 2020; Thaler & Alcalay, 2022; Maiti & Perlmutter, 2023; Dhawan et al., 2022; Morbelli et al., 2020).
- DAT-SPECT has a sensitivity of 91% with a specificity of 100% for essential tremor, a sensitivity of 86.2% with a specificity of 93.8% for drug-induced parkinsonism, and a sensitivity of 86.2% with a specificity of 82.9% for vascular parkinsonism (Morbelli et al., 2020; Ba & Martin, 2015; Brigo et al., 2014).

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- F-DOPA PET brain has a sensitivity of 73% with a specificity of 91% for evaluation of parkinsonian syndrome vs non-neurodegenerative parkinsonian syndrome (Dhawan et al., 2022).
- Neither DAT-SPECT scans nor F-DOPA PET brain scans are useful for the differentiation between subtypes of Parkinsonian syndromes, to monitor progression of disease nor to predict the risk of development of disease (Expert Panel on Neurological Imaging et al., 2020; Thaler & Alcalay, 2022; Maiti & Perlmutter, 2023).
- There is insufficient evidence for the routine use of FDG-PET brain in the diagnosis of parkinsonian syndromes (Expert Panel on Neurological Imaging et al., 2020).

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Multiple Sclerosis (MS) and Related Conditions (HD-16)

Guideline

Multiple Sclerosis (MS) (HD-16.1)
Neuromyelitis Optica Spectrum Disorders (HD-16.2)
MOG Antibody-Associated Disease (MOGAD) (HD-16.3)
Transverse Myelitis (HD-16.4)
Evidence Discussion (HD-16)
References (HD-16)

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Multiple Sclerosis (MS) (HD-16.1)

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Establishing a New Diagnosis of Multiple Sclerosis

Repeat Imaging for Unclear Diagnosis

New Neurologic Symptoms in an Individual with Multiple Sclerosis

Baseline Imaging with Disease Modifying Therapy (DMT)

Current Treatment with High-Risk Disease Modifying Therapy (DMT)

Annual Imaging on Low-Risk DMT or No Treatment

History of Clinically Isolated Syndrome (CIS) or Radiologically Isolated Syndrome (RIS)

Prolonged Treatment with Tysabri® (natalizumab)

Progressive Multifocal Leukoencephalopathy (PML) Evaluation

Background and Supporting Information

Multiple Sclerosis General Information Page

Criteria

- MRI Lumbar Spine is considered not medically necessary since cervical and thoracic studies will usually visualize the entire spinal cord. If the clinical concern is for lumbosacral radiculopathy, see **Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) with or without Low Back (Lumbar Spine) Pain (SP-6.1)** in the Spine Imaging Guidelines.
- Family members need not be screened, unless they exhibit suspicious signs or symptoms suggestive of MS.
- Computed Tomography (CT) scans of the head and/or spine are considered **NOT** medically necessary for the evaluation of multiple sclerosis due to inferior soft tissue resolution when compared to MRI.
- Quantitative Magnetic Resonance Image (MRI) Analysis of the brain
  - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be ordered as (CPT® 0865T or CPT® 0866T).

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        - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered not medically necessary in the evaluation of Multiple Sclerosis.
    - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be ordered as 3D rendering (CPT® 76376 and CPT® 76377).
        - These studies are considered not medically necessary in the evaluation of multiple sclerosis. These studies lack sufficient specificity and sensitivity to be clinically useful in the evaluation or follow up of individuals with multiple sclerosis. Their use is limited to research studies and are otherwise considered to be not medically necessary in routine clinical practice.
- AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T
    - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.

Establishing a New Diagnosis of Multiple Sclerosis

Criteria

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Indication	Medically Necessary Imaging
Establishing a new diagnosis of Multiple Sclerosis is based on the following: • Clinical suspicion based on recurrent episodes of variable neurological signs and/or symptoms **AND** • Baseline exclusion of appropriate alternative conditions that can mimic MS **OR** Clinically Isolated Syndrome (CIS)* based on **ALL** the following: • First episode of neurologic symptoms and neurologic deficits concerning for possible demyelinating disease • Symptoms last 24 hours or longer • Baseline exclusion of appropriate alternative conditions that can mimic MS **OR** Radiologically Isolated Syndrome (RIS)* based on **ALL** the following: • Individual with brain MRI obtained for unrelated reason with findings conspicuous for demyelinating disease	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) if there is a contraindication to gadolinium If optic neuritis** is suspected the following imaging is **ALSO** considered medically necessary: • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) ****For additional information related to optic neuritis see Eye Disorders and Visual Loss (HD-32.1)** **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)

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Indication	Medically Necessary Imaging
• Baseline exclusion of appropriate alternative conditions that can mimic MS	

Repeat Imaging for Unclear Diagnosis

Criteria

Indication	Medically Necessary Imaging
Diagnosis of Multiple Sclerosis remains unclear or equivocal after initial MRI • Repeat imaging 3-6 months after initial MRI Brain	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553)

New Neurologic Symptoms in an Individual with Multiple Sclerosis

Criteria

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Indication	Medically Necessary Imaging
New neurologic signs or symptoms in an individual with multiple sclerosis	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) If optic neuritis is suspected**, the following imaging is **ALSO** considered medically necessary: • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) ****For additional information related to optic neuritis, see Eye Disorders and Visual Loss (HD-32.1)** If there are new or worsening symptoms concerning for spinal cord involvement, the following imaging is **ALSO** considered medically necessary: • MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157)

Baseline Imaging with Disease Modifying Therapy (DMT)

Criteria

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Indication	Medically Necessary Imaging
• Before starting **OR** changing disease modifying therapy (DMT) **AND/OR** • 3-6 months after starting or changing DMT to establish a new MRI treatment baseline **AND/OR** • If there are new abnormal MRI Brain findings without clinical symptoms, an additional follow-up MRI Brain is supported after 6 months	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553)

Current Treatment with High-Risk Disease Modifying Therapy (DMT)

Criteria

Indication	Medically Necessary Imaging *Every 6 Months*	Medically Necessary Imaging *Annually*
Individuals treated with DMT* associated with either the risk of progressive multifocal leukoencephalopathy (PML) **AND/OR** other CNS opportunistic infections * For list of medications, see *Background and Supporting Information*	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553)	• MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157)

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Annual Imaging on Low-Risk DMT or No Treatment

Criteria

Indication	Medically Necessary Imaging Annually
Individuals with diagnosed multiple sclerosis with **EITHER** of the following: • Not treated with disease modifying therapy (DMT)* **OR** • Treated with low-risk DMT (beta interferon or glatiramer acetate medications) * For list of DMT medications, see *Background and Supporting Information*	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157)

History of Clinically Isolated Syndrome (CIS) or Radiologically Isolated Syndrome (RIS)

Criteria

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Indication	Medically Necessary Imaging *Annually*
Individual with history of Clinically Isolated Syndrome* (CIS) **OR** Individual with history of Radiologically Isolated Syndrome* (RIS) *For more information about CIS or RIS, see *Background and Supporting Information*	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) If there are new or worsening symptoms concerning for spinal cord involvement, the following imaging is **ALSO** considered medically necessary: • MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) OR • MRI Thoracic Spine without and with contrast (CPT® 72157)

Prolonged Treatment with Tysabri® (natalizumab)

Criteria

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Indication	Medically Necessary Imaging *Every 3-6 Months*	Medically Necessary Imaging *Annually*
Individuals treated with Tysabri® (natalizumab) with the following medical history: • 18 months or longer of treatment ◦ During Tysabri® (natalizumab) treatment and up to 9-12 months after transitioning off Tysabri® (natalizumab) **AND** • JC virus antibody positive	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553)	• MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157)

Progressive Multifocal Leukoencephalopathy (PML) Evaluation

Criteria

Indication	Medically Necessary Imaging
Symptoms suggestive of PML* during treatment with Tysabri® (natalizumab) or other medication with similar risk * For more information about PML, see *Background and Supporting Information*	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

- Multiple sclerosis is an autoimmune disease that is associated with inflammation, demyelination, and neurodegenerative changes within the optic nerves, brain, and spinal cord (i.e., central nervous system (CNS)).

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- Multiple sclerosis commonly begins with a relapsing-remitting course with partial or complete neurologic recovery following acute events.
  - An acute demyelinating event lasts at least 24 hours or longer
  - Common types of MS relapses include:
    - Unilateral optic neuritis
    - Brainstem or cerebellar syndrome (i.e. trigeminal neuralgia, diplopia or intranuclear ophthalmoplegia (INO), and/or ataxia)
    - Partial transverse myelitis
- The first event concerning for demyelinating disease without meeting criteria for separation of time is known as a clinically isolated syndrome (CIS).
- Individuals who undergo a brain MRI for other indications (i.e., headaches, trauma, seizure) which incidentally reveals abnormalities that are characteristic for demyelination in the absence of clinical symptoms is known as radiologically isolated syndrome (RIS).
- Progressive Multifocal Leukoencephalopathy (PML) is a progressive multi-focal disease of the central nervous system that can occur in individuals treated with immunosuppressive or immunomodulatory medications.
  - In individuals treated with natalizumab, there is an increased risk of developing PML in individuals who:
    - Received prior immunosuppressive medication, and/or
    - Have a high JC virus antibody index, and/or
    - Received natalizumab for 18 months or longer
- Interferon beta medications include (but are not limited to): Avonex®, Betaseron®, Extavia®, Plegridy®, Rebif®
- Glatiramer acetate medications include (but are not limited to): Copaxone, Glatopa®
- High-risk medications are associated with a risk of PML and/or other CNS opportunistic infections (i.e. herpes encephalitis, cryptococcal meningitis). These include (but are not limited to): Tysabri® (natalizumab), Tecfidera® (dimethyl fumarate), Gilenya® (fingolimod), Tascenso® ODT (fingolimod), Aubagio® (teriflunomide), Ocrevus® (ocrelizumab), Kesimpta® (ofatumumab), Mavenclad® (cladribine), Mayzent® (siponimod), Ponvory® (ponesimod), Vumerity® (diroximel fumarate), Zeposia® (ozanimod), Lemtrada® (alemtuzumab), Bafiertam® (monomethyl fumarate), Briumvi® (ublituximab), Rituxan® (rituximab)

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Neuromyelitis Optica Spectrum Disorders (HD-16.2)

HD.MS.0016.2.A
v1.0.2027

Criteria

Initial evaluation of Neuromyelitis Optica (NMO) or Neuromyelitis Optica Spectrum Disorders (NMOSD) with any of the following:

Indication	Medically Necessary Imaging
Clinical concern for optic neuritis	• MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540)
Recurrent hiccups or intractable nausea and/or vomiting (clinical concern for area postrema syndrome)	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)
Other neurologic signs or symptoms concerning for brain involvement	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)

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Indication	Medically Necessary Imaging
Clinical concern for transverse myelitis	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** Due to potential for conus involvement: • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148)

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Indication	Medically Necessary Imaging
Positive NMO antibody test when ordered by a neurologist or any provider in consultation with a neurologist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)

Individual with established diagnosis of (NMOSD) with any of the following:

Indication	Medically Necessary Imaging
Clinical concern for optic neuritis	• MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540)
New neurologic signs or symptoms concerning for brain involvement	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)

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Indication	Medically Necessary Imaging
Clinical concern for transverse myelitis	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** Due to potential for conus involvement: • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148)

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Indication	Medically Necessary Imaging
Repeat imaging for **ANY** of the following: • Re-establish baseline after starting treatment (typically 3-6 months after last MRI) • Changing disease modifying therapy (DMT) • As requested when ordered by a neurologist, neuro-ophthalmologist, ophthalmologist, or any provider in consultation with a neurologist, neuro-ophthalmologist, or ophthalmologist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)

- For Neuromyelitis Optica Spectrum Disorder with concern for occult neoplasm, see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.
- Computed Tomography (CT) scans of the head and/or spine are not recommended for the evaluation of NMOSD due to inferior soft tissue resolution when compared to MRI.
- Quantitative Magnetic Resonance Image (MRI) Analysis of the Brain
  - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be ordered as (CPT® 0865T or CPT® 0866T)
    - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are not medically necessary in the evaluation of NMOSD).
  - Volumetric or quantitative analysis of the brain or temporal lobes and hippocampus may be ordered as 3D rendering (CPT® 76376 or CPT® 76377).
    - These studies are considered not medicaly necessary in the evaluation of NMOSD.

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These studies lack sufficient specificity and sensitivity to be clinically useful in the evaluation or follow up of individuals with NMOSD. Their use is limited to research studies and are otherwise considered to be not medically necessary in routine clinical practice.

- AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T
  - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.

Background and Supporting Information

- Neuromyelitis optica spectrum disorder (NMOSD, Devic's disease) is a chronic inflammatory autoimmune disease that involves the optic nerves, spinal cord, and brain.
- Core clinical characteristics of NMOSD include:
  - Optic neuritis
    - Frequently bilateral optic nerve involvement with severe vision loss
  - Longitudinally extensive transverse myelitis
    - Extends 3 or more complete vertebral segments of the spinal cord
  - Area postrema syndrome
    - Otherwise, unexplained episode of recurrent hiccups or intractable nausea and vomiting
  - Brainstem or cerebral syndrome with NMOSD typical brain lesions
  - Rarely paraneoplastic syndromes occur with NMO spectrum disorder
  - Medications used for the treatment of NMO spectrum disorders include (but are not limited to) azathioprine, Enspryng® (satralizumab), mycophenolate, Soliris® (eculizumab), rituximab, Uplizna® (inebilizumab) and Ultomiris® (ravulizumab)[54]
    - Possible adverse reactions associated with treatment include risk of PML and meningococcal infections.

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MOG Antibody-Associated Disease (MOGAD) (HD-16.3)

HD.MS.0016.3.A
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Criteria

Initial evaluation of MOG (myelin oligodendrocyte glycoprotein) antibody-associated diseases (MOGAD) with any of the following:

Indication	Medically Necessary Imaging
Clinical concern for optic neuritis	• MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540)
Neurologic signs or symptoms concerning for brain involvement	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)
Clinical concern for transverse myelitis	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** Due to potential for conus involvement: • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148)

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Indication	Medically Necessary Imaging
Positive MOG antibody test when ordered by a neurologist or any provider in consultation with a neurologist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** Due to potential for conus involvement: • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148)

Individuals with established diagnosis of (MOGAD) with any of the following:

Indication	Medically Necessary Imaging
Clinical concern for optic neuritis	• MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540)
Neurologic signs or symptoms concerning for brain involvement	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)

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Indication	Medically Necessary Imaging
Clinical concern for transverse myelitis	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** Due to potential for conus involvement: • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148)
Repeat imaging for **ANY** of the following: • Re-establish baseline after starting treatment (typically 3-6 months after last MRI) • Changing disease modifying therapy (DMT) • As requested when ordered by a neurologist, neuro-ophthalmologist, ophthalmologist, or any provider in consultation with a neurologist, neuro-ophthalmologist, or ophthalmologist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** MRI Thoracic Spine without contrast (CPT® 72146)

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- For MOG (myelin oligodendrocyte glycoprotein) Antibody-Associated Disease with concern for occult neoplasm, see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.
- Computed Tomography (CT) scans of the head and/or spine are not recommended for the evaluation of MOG (myelin oligodendrocyte glycoprotein) Antibody-Associated Disease due to inferior soft tissue resolution when compared to MRI.

Background and Supporting Information

- MOG (myelin oligodendrocyte glycoprotein)-IgG disorders are CNS inflammatory diseases, distinct from multiple sclerosis and NMO-spectrum disorders.
- Unlike multiple sclerosis and neuromyelitis optica spectrum disorder (NMOSD), individuals with MOG antibody-associated disease (MOGAD) can have a monophasic or relapsing course.
  - Relapses are more common in the first six months after the first episode.
  - An acute relapse is considered when an individual with MOGAD develops new neurologic signs or symptoms at least 30 days following the previous event.
- Diagnosis is based on the clinical presentation, MRI findings, and the presence of auto-antibodies.
- Clinical features of individuals with MOGAD include
  - Optic neuritis
    - Bilateral optic neuritis is common at onset, and seems to be more frequent in individuals with MOGAD than with those with multiple sclerosis or neuromyelitis optica spectrum disorder (NMOSD).
    - Vision improves quickly with return to normal or near normal visual acuity following treatment with intravenous corticosteroids.
  - Transverse myelitis
    - Cauda equina and peripheral nerve root involvement can occur (lumbar spine imaging is considered medically necessary)
    - Can occur as an isolated episode of transverse myelitis, as a component of ADEM or in conjunction with optic neuritis.
    - T2 spinal cord lesions often are centrally located and can be restricted to the grey matter producing the “H sign” on MRI
    - Most T2 lesions resolve or reduce in size substantially on follow-up MRI
  - Brainstem encephalitis
  - Encephalitis with seizures
  - Acute disseminated encephalomyelitis (ADEM)
    - Occurs mainly in children but can occur in adults.
  - Tumefactive brain lesions
  - Cranial neuropathies

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- Unlike multiple sclerosis, it is rare for individuals with MOGAD to develop asymptomatic lesions within the brain, optic nerves, and/or spinal cord.

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Transverse Myelitis (HD-16.4)

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Criteria

An initial assessment, to include a pertinent history and neurologic exam, should be performed prior to imaging requests.

Clinical Concern for Transverse Myelitis

Indication	Medically Necessary Imaging
Clinical concern for transverse myelitis	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** Due to potential for conus involvement: • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148) **AND/OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) If optic neuritis is suspected*, the following imaging is **ALSO** considered medically necessary: • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) ***For additional information related to optic neuritis see Eye Disorders and Visual Loss (HD-32.1)**

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New Neurologic Signs or Symptoms in an individual with a history of transverse myelitis (TM)

Indication	Medically Necessary Imaging
New neurologic signs or symptoms	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) If optic neuritis is suspected*, the following imaging is **ALSO** considered medically necessary: • MRI Orbit without and with contrast (CPT® 70543) **OR** • MRI Orbit without contrast (CPT® 70540) ***For additional information related to optic neuritis, see Eye Disorders and Visual Loss (HD-32.1)**

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Surveillance of Transverse Myelitis

Indication	Medically Necessary Imaging Annually for 5 years
Individual with a history of transverse myelitis • Ordered by a neurologist or any provider in consultation with a neurologist	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146) **AND/OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)

- For transverse myelitis with concern for occult neoplasm, see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.
- Individuals with transverse myelitis present with various symptoms of sensory, motor and/or autonomic dysfunction.
  - Bilateral signs and/or symptoms (although not necessarily symmetrical)
  - Examination findings may include but are not limited to any of the following:
    - Bilateral limb weakness
    - Loss of manual dexterity
    - New or worsening foot drop
    - Sensory level
    - Hyperreflexia (including upgoing toes, positive Babinski, Hoffman's sign, clonus)
    - Gait abnormality (spastic or ataxic gait)
  - If inflammation is identified within the spinal cord suggestive of transverse myelitis, a brain MRI is recommended to evaluate for a multifocal inflammatory process
- See **Multiple Sclerosis (MS) (HD-16.1)**, **Neuromyelitis Optica Spectrum Disorders (HD-16.2)**, **MOG Antibody-Associated Diseases (MOGAD) (HD-16.3)**

Background and Supporting Information

- Symptoms may include but are not limited to the following:
  - Motor weakness of a limb or limbs, including paraparesis and/or complete paralysis
  - Change in sensation in a limb or limbs that may be associated with paresthesias and/or dysthesias.

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- Urinary urgency, incontinence, and/or urinary retention
- Worsening constipation and/or bowel urgency/incontinence
- Sexual dysfunction
- Lhermitte's sign
- New or worsening spasticity

- Acute transverse myelitis is defined as an acute inflammatory syndrome leading to motor and/or sensory impairment, with or without sphincter dysfunction, secondary to a variety of autoimmune or inflammatory diseases.
- Diagnosed by spinal MRI and/or cerebrospinal fluid.
- Individuals typically progress to maximal neurological deficits within 4 weeks.
- Longitudinally extensive transverse myelitis (≥3 vertebral segments) is more commonly associated with neuromyelitis optica spectrum disorders (NMOSD) and/or MOG antibody-associated diseases (MOGAD)
- Transverse myelitis:
  - May be idiopathic
  - Initial event of multiple sclerosis (see **Multiple Sclerosis (MS) (HD-16.1)**
  - Initial event of neuromyelitis optica spectrum disorder (NMOSD) (see **Neuromyelitis Optica Spectrum Disorders (HD-16.2)**)
  - Initial event of MOG antibody-associated disease (MOGAD) (see **MOG Antibody-Associated Diseases (MOGAD) (HD-16.3)**)
  - May be associated with connective tissue disease
    - Systemic lupus erythematous (SLE)
    - Rheumatoid Arthritis (RA)
    - Sjögren's syndrome
    - Systemic sclerosis
  - Manifestation of neurosarcoidosis (see **Autoimmune/Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD-14.3)**)
  - Post-infectious and/or post-vaccination related
    - COVID-19 and COVID-19 post-vaccination myelitis cases have been reported (see **Neuro-COVID-19 and Sars-COV-2 Vaccines (HD-14.2)**)
    - May have a prodromal syndrome with fever, respiratory and/or gastrointestinal symptoms
    - May be associated with headache, neck stiffness or recurrence of fever

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Evidence Discussion (HD-16)

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- Magnetic resonance imaging (MRI) is the recommended imaging modality for the diagnosis and monitoring of multiple sclerosis (MS) and other inflammatory diseases of the central nervous system (CNS). Its high sensitivity for the evaluation of inflammatory and neurodegenerative processes in the brain and spinal cord has made it the gold standard for the evaluation of individuals with MS (Expert Panel on Neurologic Imaging et al., 2018; Jarius et al., 2023).
- Computed Tomography Scan (CT) is not recommended for the evaluation of MS due to inferior soft tissue resolution when compared to MRI (Banwell et al., 2023; ACR, 2024; Expert Panel on Neurological Imaging et al., 2021).
- MRI plays an important role in the following clinical scenarios:
  - establishing the diagnosis of multiple sclerosis (MS) by establishing evidence for dissemination in space and time (Expert Panel on Neurologic Imaging et al., 2018; Jarius et al., 2023).
  - diagnostic workup. Approximately 50%-90% of individuals with MS have spinal cord lesions (Expert Panel on Neurological Imaging et al., 2018).
  - detecting optic nerve abnormalities in individuals with symptoms concerning for optic neuritis (Kaunzer & Gauthier, 2017; Expert Panel on Neurologic Imaging et al., 2021).
  - assessment of treatment response and in monitoring for potential treatment related safety concerns. Management and surveillance intervals are primarily consensus based and have been addressed in several evidence and practice-based guidelines (Kaunzer & Gauthier, 2017; Expert Panel on Neurological Imaging et al., 2018) .
  - evaluation of other central nervous system (CNS) inflammatory diseases, including autoimmune disseminated encephalomyelitis (ADEM), neuromyelitis optica (NMO), myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD) and transverse myelitis (TM) (Banwell et al., 2023; Jarius et al., 2023; Transverse Myelitis Consortium Working Group, 2002; Shahriai et al., 2021).
  - detecting conus medullaris involvement in individuals with myelin oligodendrocyte glycoprotein-associated disease (MOGAD) and transverse myelitis (Banwell et al.,2023; Transverse Myelitis Consortium Working Group, 2002; Shahriai et al., 2021).

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Papilledema/Pseudotumor Cerebri (HD-17)

Guideline

Papilledema/Pseudotumor Cerebri (HD-17.1)
References (HD-17)

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Papilledema/Pseudotumor Cerebri (HD-17.1)

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Criteria

- See **Eye Disorders and Visual Loss (HD-32.1)**
- Papilledema and Pseudotumor Cerebri (Idiopathic Intracranial Hypertension, Benign Intracranial Hypertension):
  - MRI Orbits/Face/Neck without contrast (CPT® 70540) **OR** MRI Orbits/Face/Neck without and with contrast (CPT® 70543) **OR** CT Orbits/Temporal bone with contrast (CPT® 70481) **OR** CT Orbit/Temporal bone without contrast (CPT® 70480) **AND/OR** MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is/are considered medically necessary for:
    - Suspected elevated intracranial pressure **AND/OR** papilledema
    - CT Head without contrast (CPT® 70450) is considered medically necessary when MRI is contraindicated or for urgent evaluation
    - See **General Guidelines – CT Head (HD-1.4)** regarding required use of CT Head prior to lumbar puncture and/or spinal tap.
    - See **Eye Disorders and Visual Loss (HD-32.1)** regarding concern for orbital pseudotumor or primary orbital disorder.
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) is considered medically necessary, in addition, for venogram when requested.
    - CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures
    - See **Stroke/TIA (HD-21.1)**
    - See **Cerebral Venous Thrombosis (HD-21.8)**
  - Repeat structural and/or vascular imaging, with any of the above listed studies, for follow-up, including to confirm stent patency, and for evaluation of worsening symptoms, or suspected complications, as requested by a neurologist or a neurosurgeon or any provider in consultation with a neurologist or a neurosurgeon.
    - See also **Hydrocephalus Shunts (HD-11.14)**

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Background and Supporting Information

Treatment for idiopathic intracranial hypertension (IIH) includes weight loss and acetazolamide. Surgical interventions include optic nerve sheath fenestration, cerebrospinal fluid shunting, and bariatric surgeries. These surgical procedures are invasive and associated with complications.

Venous sinus stenting is a treatment option for those with idiopathic intracranial hypertension who have failed first line therapy. Prior to stenting, individuals should undergo venography. CTV and/or MRV can be performed to confirm stent patency.

Stenting improves tinnitus, papilledema, diplopia/visual disturbances, and headaches.

Post-stent complications include subdural hematoma, subarachnoid hemorrhage, worsening headaches, visual impairment, worsening papilledema, blindness, arterial dissection, and death. Venous sinus stenting has lower complications relative to surgical interventions.

Evidence Discussion (HD-17)

- In the evaluation of suspected or known intracranial hypertension and/or exam findings of papilledema, neuroimaging is helpful for diagnosis, excluding other structural causes, and for the identification of venous outflow obstruction (Expert Panel on Neurologic Imaging et al., 2022; Wall, 2017; Costello & Scott, 2019).
- MRI Brain allows detection of findings supportive of intracranial hypertension and detection of structural abnormalities such as mass, edema, or hydrocephalus (Friedman, 2014; Expert Panel on Neurological Imaging et al. 2022; Thurtell, 2019; Costello & Scott, 2019; Kennedy 2018). MR Venogram allows identification of venous sinus stenosis and thrombosis for treatment planning in these scenarios (Expert Panel on Neurologic Imaging et al., 2023; Thurtell, 2019; Costello & Scott, 2019).
- Alternatively, CT Head allows exclusion of secondary causes such as hydrocephalus, mass, or edema, particularly in urgent scenarios (Friedman, 2014; Expert Panel on Neurologic Imaging et al., 2023; Costello & Scott, 2019; Expert Panel on Neurologic Imaging et al., 2018). CT Venogram allows direct vessel visualization to exclude venous outflow obstruction in these cases (Friedman, 2014; Expert Panel on Neurologic Imaging et al., 2023; Costello & Scott, 2019).
- In addition, orbital symptoms may be evaluated with either CT Orbits or MRI Orbits, with CT providing superior bony anatomy evaluation and calcification detection and MRI providing superior soft tissue resolution and evaluation of the optic nerve (Friedman, 2014; Thurtell, 2019; Costello & Scott, 2019; Expert Panel on Neurologic Imaging et al., 2018).

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Paresthesias and/ or Weakness (HD-18)

Guideline

Sensory/Weakness Complaints (HD-18.1)
References (HD-18)

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Sensory/Weakness Complaints (HD-18.1)

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Criteria

Advanced imaging for complaints of sensory loss and/or paresthesias (see *Background and Supporting Information)* and/or weakness that are unaccompanied by other symptoms and not preceded by trauma must have the following: a thorough clinical history and a detailed neurological exam (including the symptomatic area).

Imaging for sensory and weakness complaints is considered medically necessary with the following findings:

Indications	Medically Necessary Imaging
ANY of the following: • Hyperreflexia • Babinski/Hoffman sign • Increased tone in affected limb • Bladder and/or bowel dysfunction • Motor symptoms in ANY of the following patterns: ◦ Two limbs on same side of body ◦ Face and limb involvement ◦ Bilateral lower limb weakness • Sensory symptoms in ANY of the following patterns: ◦ Two limbs on same side of body ◦ Face and limb involvement ◦ Lhermitte's sign	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157)

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Findings Specific to the Spinal Cord	Medically Necessary Imaging
ANY of the following: • Decreased pinprick sensation on one side of the body with weakness and decreased proprioception on the other side • Sensory level (also called spinal cord level) on the trunk with sensory loss in both legs • Lhermitte's sign • Bilateral lower limb weakness • Tight band around the trunk or torso • Pure sensory symptoms with proximal and distal involvement and a symmetric pattern • Decreased or absent reflexes AND noted concern for spinal cord shock or acute spinal cord injury	• MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157)

Findings Specific to the Terminal End of the Spinal Cord	Medically Necessary Imaging
Concern for conus medullaris syndrome. • Symptoms may include, but are not limited to: ◦ Saddle anesthesia ◦ Urinary retention ◦ Bowel incontinence ◦ Lower limb paresthesias ◦ Unilateral or bilateral lower limb weakness	• MRI Lumbar Spine without contrast (CPT® 72148) **OR** • MRI Lumbar Spine without and with contrast (CPT® 72158)

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- MRI Lumbar Spine is typically considered not medically necessary to visualize the spinal cord except in the clinical scenarios noted above. MRI Cervical Spine and MRI Thoracic Spine will image the entire spinal cord.
- Findings NOT consistent with central nervous system localization and NOT supporting brain or spinal cord imaging include:
  - Sensory loss that involves the hands and feet and not the trunk
  - Limb pain
- For symptoms after trauma, refer to **Head Trauma (HD-13.1)** and/or the appropriate level in the Spine Imaging Guidelines
- For generalized weakness, polyneuropathy, and/or other patterns of sensory and/or motor symptoms not referenced above, refer to the following guidelines:
  - Myopathy or myositis, see **Muscle Diseases (PN-8.5)** and **Gaucher Disease (Storage Disorders) (PN-8.6)**
  - Motor Neuron Disease or Amyotrophic Lateral Sclerosis (ALS), see **Motor Neuron Disease/Amyotrophic Lateral Sclerosis (ALS) (PN-8.1)**
  - Neuromuscular Junction Disorders, see **Neuromuscular Junction Disorders (PN-8.4)**
  - Multifocal Motor Neuropathy (MMN) and Chronic Inflammatory Demyelinating Polyneuropathy (CIDP), see **Polyneuropathy (PN-3.1)**
  - Polyneuropathy, see **Polyneuropathy (PN-3.1)**
  - Neuropathy with concern for malignancy, see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines
  - Proximal asymmetric and concern for plexopathy, see **Brachial Plexus (PN-4.1)** and/or **Lumbar and Lumbosacral Plexus (PN-5.1)**
  - Sensory and/or motor symptoms localized to a single nerve, see **Focal Neuropathy (PN-2.1)**
  - Thoracic Outlet Syndrome, see **Thoracic Outlet Syndrome (CH-31.1)** in the Chest Imaging Guidelines
  - Radiculopathy, see appropriate level in the Spine Imaging Guidelines
  - Cauda Equina Syndrome, see **Red Flag Indications (SP-1.2)** in the Spine Imaging Guidelines

Background and Supporting Information

- Paresthesia refers to an abnormal sensation that is associated with nervous system dysfunction and may be described as a tingling, pricking, pins and needles, or a burning sensation. The priority is to determine whether the etiology is due to pathology of the peripheral nervous system (PNS) or central nervous system (CNS).
- A thorough clinical history, including symptom location and time course, can be helpful to differentiate PNS pathologies from CNS. For example, paresthesia affecting one side of the face and/or body (i.e., hemisensory deficit) points strongly towards

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central nervous system dysfunction. Therefore, brain and/or spinal cord imaging may be supported based on the location of symptoms. Typically, lumbar spine imaging is not supported unless there is sphincter involvement, saddle anesthesia, and/or cauda equina syndrome is suspected. In contrast, an insidious course of distal, symmetric limb paresthesia is more commonly associated with peripheral nerve abnormalities. In such cases, NCS/EMG testing results should be completed prior to advanced imaging. (See *Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines)*.

- Upper motor neuron signs (e.g., increased tone, hyperreflexia, presence of Babinski or Hoffman signs) may support a need for central nervous system imaging.
- Lower motor neuron signs (e.g., decreased tone, hypo- or areflexia, muscle atrophy) may support evaluation for peripheral nervous system diseases. Nerve conduction and needle EMG testing should be completed prior to advanced imaging.
- It is important to note that both peripheral and central nervous system disease can co-exist. As a result, if both upper and lower motor neuron signs are observed simultaneously, advanced imaging may be supported regardless of NCS/EMG testing results, (see **Polyneuropathy (PN-3.1)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines).
- Babinski sign - presence of an upgoing big toe with stimulation of the lateral plantar region of the foot.
- Hoffman sign - involuntary flexion of the fingers, particularly the thumb and index fingers, triggered by flicking the distal segment of the middle finger.
- Spinal cord shock/acute spinal cord injury - occurs after hyperacute or acute injury to the cord and presents with flaccid areflexia below the level of injury. May be associated with hypotension and/or bradycardia if loss of sympathetic tone occurs. Signs may last from days to weeks before upper motor neuron findings develop.
- Conus Medullaris Syndrome - compressive damage to the spinal cord from T12-L2. Symptoms suggestive of conus medullaris syndrome include saddle anesthesia, urinary retention, bowel incontinence, and/or lower extremity motor or sensory changes.

Evidence Discussion (HD-18)

- The imaging modality of choice for the evaluation of signs or symptoms localizing to the spinal cord is with MRI (London, 2020; Hardy, 2021; Larson & Wilbur, 2020; Wattjes et al., 2021; Expert Panel on Neurological Imaging et al., 2021). MRI allows visualization of the soft tissues and structures that comprise the neural axis (London, 2020; Wattjes et al., 2021; Expert Panel on Neurological Imaging et al., 2021). Imaging of the cervical and thoracic segments are sufficient to view the entire spinal cord (Hardy 2021; Wattjes et al., 2021).
- MRI of the lumbar spine is reserved for the evaluation of conus and the cauda equina (Hardy, 2021).

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- For evaluation of isolated distal symmetric polyneuropathy, MRI of the brain and/or spine rarely change management in these individuals despite being frequently performed. MRI has little role in these scenarios as it evaluates the central nervous system (Callaghan et al., 2015).

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Pituitary, Sella, Hypothalamus (HD-19)

Guideline

Pituitary (HD-19.1)
Post-Operative and Repeat Imaging Indications (HD-19.2)
Empty Sella Turcica (HD-19.3)
Craniopharyngioma and Other Hypothalamic/Pituitary Region Tumors (HD-19.4)
Evidence Discussion (HD-19)
References (HD-19)

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Pituitary (HD-19.1)

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Criteria

- Endocrine laboratory studies should be performed prior to considering advanced imaging, except in the cases of stable, non-functioning microadenomas or macroadenomas, cysts, and/or for incidentally found lesions.
- MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) with a specific pituitary protocol that includes fine cuts through the sella is considered medically necessary as the primarily performed pituitary imaging:
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) or CT Head without and with contrast (CPT® 70470) are considered medically necessary alternatives
  - CT Head without contrast (CPT® 70450) or without and with contrast (CPT® 70470) **AND/OR** CT Maxillofacial without contrast (CPT® 70486) is considered medically necessary in addition to MRI to visualize perisellar bony structures in the pre-operative evaluation of certain sellar tumors and for pre-operative planning for transphenoidal approaches
    - See **General Guidelines – Anatomic Issues (HD-1.1)** as CT Temporal bone (CPT® 70480) is considered medically necessary instead of CT Maxillofacial per surgeon's preference and contrast level
  - CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) is considered medically necessary for surgical planning
  - MRI Brain without and with contrast (CPT® 70553) covers both brain and dedicated pituitary if performed at the same time; no additional CPT® codes are considered medically necessary
- Medically necessary repeat imaging for incidentally found lesions on other studies:
  - MRI Brain without and with contrast (CPT® 70553) or MRI Orbit/Face/Neck without and with contrast (CPT® 70543) follow-up dedicated pituitary study obtained if a pituitary abnormality is reported incidentally on a MRI Brain or CT Head performed for other reasons (MRI Brain without and with contrast [CPT® 70553] covers both brain and dedicated pituitary if performed at the same time; no additional CPT® codes are needed); further evaluation and subsequent imaging dependent on specific imaging and biochemical laboratory evaluation findings.
- Repeat imaging in the setting of worsening clinical status or new neurologic symptoms
- See in the Pelvic Imaging Guidelines for initial lab and imaging work up to exclude other causes. See Female Hypogonadism or Prolactinoma or other relevant sections in the grid if suspicion for pituitary tumor/disease or **Craniopharyngioma and Other**

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Hypothalamic/Pituitary Region Tumors (HD-19.4) for suspicion of hypothalamic causes.

Pituitary Imaging

Indication	Medically Necessary Initial Imaging	Medically Necessary Repeat Imaging
Microadenoma: Nonfunctioning, unexplained pituitary asymmetries, or incidentally found small tumors (less than 10mm)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) at 12 months and then (if stable in size), every 1-2 years for 3 years, and less frequently thereafter based on clinical status
Macroadenoma (10mm or greater): Nonfunctioning and/ or not surgically removed including those with a post-operative remnant	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) every 6 months for the first year and then (if stable in size), every year for 3 years, and less frequently thereafter based on clinical status (longer if craniopharyngioma)
Acromegaly* (Elevated IGF-1 confirmed by lack of suppression of growth hormone on glucose suppression testing)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) ◦ At least 12 weeks after surgery to evaluate for residual tumor ◦ If treated with Pegvisomant, 6 to 12 months after treatment initiated, then annually if stable ◦ Long-term follow-up imaging based on clinical and biochemical status at the request of a specialist or any provider in consultation with a specialist

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Indication	Medically Necessary Initial Imaging	Medically Necessary Repeat Imaging
Cushing's Disease** (Pituitary ACTH excess leading to hypercortisolism)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) ◦ At least 12 weeks after surgery as new baseline ◦ Annually after bilateral adrenalectomy for Cushing's disease or ectopic ACTH production ◦ Long-term follow-up imaging based on clinical and biochemical status at the request of a specialist or any provider in consultation with a specialist
Rathke's cleft cyst/ Simple cyst	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) in one year; if stable and without mass effect or invasion into surrounding structures, no further imaging is required.

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Indication	Medically Necessary Imaging
Prolactinomas* **	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) with: ◦ Diagnosis: ▪ Unexplained prolactin level above the normal range ◦ On Dopamine Agonist (DA) therapy with good response: ▪ Macroadenomas 3 months after start of DA therapy ▪ Microadenomas 1 year after start of DA therapy ▪ To decide on stoppage of therapy after ~2 years if in “remission” (normal PRL and no visible tumor on MRI) ◦ On Dopamine Agonist therapy with suboptimal response: ▪ PRL levels rise ▪ New symptoms develop (galactorrhea, vision changes, headaches, pituitary deficiency) ▪ If on high dose maximal DA and no plans for surgery/radiation therapy use guideline for microadenoma or macroadenoma ◦ After Dopamine Agonist therapy: ▪ Rise in PRL level ▪ For DA stoppage at menopause, use guideline for microadenoma or macroadenoma ◦ Not on therapy – refer to recommendations for repeat imaging for microadenoma or macroadenoma ◦ Galactorrhea/nipple discharge with normal prolactin and thyroid function levels: See **Nipple Discharge/ Galactorrhea (BR-6.1)** in the Breast Imaging Guidelines
Medication-induced Prolactinemia**	• To differentiate between medication-induced hyperprolactinemia and hyperprolactinemia due to a pituitary or hypothalamic mass if the medication cannot be discontinued or hyperprolactinemia persists after medication discontinuation

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Indication	Medically Necessary Imaging
TSH, FSH, or LH producing adenomas (inappropriate pituitary hypersecretion of TSH, FSH or LH)***	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) when hormone levels are inappropriately elevated and there is a concern for a pituitary lesion. • Refer to appropriate post-operative, or Microadenoma/ Macroadenoma guidelines based on the size of the lesion and initial management. ◦ Long-term follow-up imaging based on clinical and biochemical status at the request of a specialist or any provider in consultation with a specialist
Male Hypogonadism****	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) if **ONE** of the following: ◦ Severe secondary hypogonadism (as indicated by morning serum testosterone level <150 ng/dl and low or normal LH and FSH levels) (See *Background and Supporting Information*) ◦ Below normal testosterone level (serum total testosterone, free testosterone, and/or bioavailable morning testosterone) AND low or normal LH and FSH levels, in an individual with either: ▪ Panhypopituitarism ▪ Hyperprolactinemia ▪ Signs of tumor mass effect (headache, visual impairment, or visual field deficit) ▪ Elevated sex hormone binding globulin (SHBG)
Female Hypogonadism (Secondary Amenorrhea may be a feature)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) for normal or low FSH with low estradiol (LH may be normal or low also)

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Indication	Medically Necessary Imaging
Growth Hormone Deficiency (Adult onset)	MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) for the following: • Low Growth Hormone (GH) **OR** • Low IGF-1 **AND** • One abnormal provocative test (likely will be Glucagon Stimulation test as GNRH is unavailable and Insulin Tolerance test poses risks) • If 3 or more pituitary hormones are deficient (including GH), then provocative test is not needed.
Secondary (Central) Adrenal Insufficiency	MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) for the following: • ACTH is low or normal at 10 or lower **AND** • Low baseline cortisol level <3 µg/dL **OR** • abnormal ACTH stimulation test with suboptimal cortisol stimulation where cortisol does not reach above 18 µg/dL
Central Hypothyroidism	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) for the following: ◦ Low free T4 with normal, low, or mildly elevated TSH
Hypopituitarism **(deficiency of one or more pituitary hormones)**	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551)

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Indication	Medically Necessary Initial Imaging	Medically Necessary Repeat Imaging for Non-Operative Care
Diabetes Insipidus (DI) - ADH deficiency	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) if: ◦ Laboratory testing consistent with DI (serum osmolality should be high and urine osmolality should be low) and etiology uncertain	NA
Syndrome of Inappropriate ADH (SIADH)	• MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) if: ◦ Etiology remains uncertain or is thought to be in the nervous system ◦ Urine osmolality should be high and serum osmolality low	NA
Other Pituitary Region Tumors	• Evaluation may require CT in addition to MRI to evaluate for hyperostosis.	

Background and Supporting Information

- ***Acromegaly:** A serum level of growth hormone greater than 1ng/mL when measured two hours following an oral glucose load confirms acromegaly.
- ****Cushing's Disease:** It is important to differentiate Cushing's syndrome (hypercortisolism from any source) from Cushing's disease which is ACTH hypersecretion from the pituitary gland. Hypercortisolism is quantified by 24hour urine cortisol collection, low dose dexamethasone suppression test and/or late-night salivary cortisol measurement. ACTH is elevated or inappropriately normal in Cushing's disease and ectopic sources of ACTH production but suppressed in other causes of hypercortisolism. A high dose dexamethasone suppression test can help determine if the elevated ACTH is from a pituitary or ectopic source. Petrosal sinus sampling may be required for tumor localization pre-operatively in the setting of a normal pituitary MRI or a small adenoma. These tumors may be managed with surgery, medical therapy, radiation, and/or bilateral adrenalectomy.
- ***Prolactinoma:** To establish the diagnosis of hyperprolactinemia, a single measurement of serum prolactin is recommended; a level above the upper limit of normal confirms the diagnosis as long as the serum sample was obtained without excessive venipuncture stress. Pregnancy and primary hypothyroidism should be

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excluded as physiologic causes of prolactin elevation and medications that may be contributing to prolactin elevation should be considered. Dopamine agonist therapy is typically stopped during pregnancy, monitoring of prolactin levels ceases. Routine imaging surveillance during pregnancy is not recommended due to risk to fetus. Repeat imaging with MRI without gadolinium can be performed however for new or worsening symptoms, such as headaches or visual symptoms.

- **** **Medication-induced prolactin elevation:** Medication induced hyperprolactinemia is seen most commonly with antipsychotics/neuroleptics and antidepressants but may also be seen with some anti-emetics and antihypertensive agents. In individuals on prolactin elevating drugs, a prolactin level should be repeated after withdrawal of medications for 72 h, however, this approach may not be safe if this treatment is offered for psychiatric indications. If stopping the drug is not feasible, pituitary MRI is advised to rule out a sellar/parasellar tumor.
- *****TSH, FSH, or LH producing adenomas:** These are the least common of all hormonally active pituitary tumors. Individuals with TSH secreting adenomas have inappropriate TSH elevation in the setting of hyperthyroidism (elevated thyroid hormone levels). Almost all gonadotroph adenomas are clinically non-functioning. The infrequent presentation of a functioning gonadotroph adenoma should be differentiated clinically from appropriate FSH and LH elevation seen in low estrogen states (including menopause) as well as primary hypogonadism (testicular failure). Functioning TSH, FSH or LH pituitary adenomas may be managed with surgical, radiation and/or medical therapies.
- ******Male Hypogonadism:** Alterations in sex hormone-binding globulin (SHBG) can impact testosterone levels. Free or bioavailable testosterone concentrations should be measured when total testosterone concentrations are close to the lower limit of the normal range and when altered SHBG levels are suspected (e.g. moderate obesity, nephrotic syndrome, hypo- and hyperthyroidism, use of glucocorticoids, progestins, estrogens, and androgenic steroids, anticonvulsants, acromegaly, diabetes mellitus, aging, HIV disease, liver cirrhosis, hepatitis). LH and FSH should be obtained to evaluate for secondary (central) hypogonadism once low testosterone level is confirmed. Morning testosterone level is drawn anytime before 10 am for a typical sleep-wake cycle.
- Central hypothyroidism is an anatomic or functional disorder of the pituitary gland or the hypothalamus, resulting in altered TSH secretion. Diagnosis is usually made biochemically with low circulating free T4 (FT4) concentrations associated with low/normal serum TSH levels.

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Post-Operative and Repeat Imaging Indications (HD-19.2)

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Criteria

- For imaging in the immediate post-operative period or for acute surgical complications
  - See **Primary Central Nervous System Tumors (ONC-2.1)** in the Oncology Imaging Guidelines.
- A routine post-operative MRI is generally done at 3 months and/or at the discretion of, or in consultation with an Endocrinologist, Neurologist, Neurosurgeon, ENT, Ophthalmologist, Neuro-Ophthalmologist or Radiation Oncologist.
- Frequency of follow-up imaging depends on the post-operative size and/or functional status of the pituitary adenoma. Refer to the grid sections for Microadenoma/ Macroadenoma as well as those for disorders of pituitary hormone excess.
- Individuals with hyper-functioning tumors such as acromegaly, Cushing's disease, and excess TSH secretion may be treated with a combination of surgery, medical therapy, and radiation. Long-term monitoring of clinical status and repeat imaging at the discretion of, or in consultation with an Endocrinologist, Neurologist, Neurosurgeon, ENT, Ophthalmologist, Neuro-Ophthalmologist or Radiation Oncologist.

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Empty Sella Turcica (HD-19.3)

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Criteria

- Enlarged/Empty Sella Turcica: An enlarged sella turcica without evident tumor is an incidental finding on MRI Brain or CT Head from a defect in the dural diaphragm of the sella (especially if there is elevated intracranial pressure from another cause), pituitary surgery, or as a result of a pituitary tumor which has expanded the sella and then infarcted (pituitary apoplexy).
- MRI Brain without and with contrast (pituitary protocol) (CPT® 70553) with thin sections of pituitary or MRI Brain without contrast (CPT® 70551) is considered medically necessary. CT Head without and with contrast (CPT® 70470) – If MRI is contraindicated.
  - Primary Empty Sella:
    - Incidentally found on other studies, asymptomatic and no related abnormalities: follow-up at 2 years. No further imaging unless clinical symptoms develop (neuro-/ophthalmological symptoms, intracranial hypertension, or endocrine/hormonal abnormalities).
    - Following medical or surgical treatment of related endocrine, neurological, or ophthalmological problems: follow-up imaging every 6 months in the year after treatment and/or at the request of a specialist or any provider in consultation with a specialist (see **Papilledema/Pseudotumor Cerebri (HD-17.1)** for additional imaging recommendations)
  - Secondary Empty Sella
    - Imaging according to the cause or if clinical disease progression (such as adenomas, infiltrative or malignant disorders, hormonal abnormalities, neuro-/ophthalmological symptoms)

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Craniopharyngioma and Other Hypothalamic/Pituitary Region Tumors (HD-19.4)

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- See **Craniopharyngioma and Other Hypothalamic/Pituitary Region Tumors (PEDONC-4.10)**

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Evidence Discussion (HD-19)

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- MRI imaging of the Sella region using high-resolution pituitary protocols is the preferred diagnostic imaging modality for evaluation of the pituitary and sellar regions and is considered the gold standard for imaging the pituitary gland when there is suspicion of hypothalamic pituitary disease (Burns et al., 2019).
- Both the anatomy and pathology of the pituitary gland and surrounding areas including optic chiasm, infundibulum, and vascular structures, as well as an empty sella, are reliably depicted on MRI (Burns et al., 2019).
- MRI is the most sensitive imaging study for evaluating pituitary disease (Burns et.al., 2019).
- CT of the Sella can be used to detect bone destructive lesions of the skull base, such as craniopharyngiomas, menigiomas, or larger pituitary macroadenomas, but CT is insensitive when compared to MRI for pituitary pathology (Burns et.al., 2019).
- MRI utilizes a magnetic field and radio waves with computer processing to produce detailed images whereas CT uses ionizing radiation. Radiation dosages vary based on many factors and can be harmful to tissues. Thus, from radiation safety perspective MRI should be utilized when appropriate and supported by existing literature (ACR, 2022).

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Scalp and Skull (HD-20)

Guideline

Scalp and Skull Lesions (HD-20.1)
Skull Base Osteomyelitis (SBO) (HD-20.2)
References (HD-20)

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Scalp and Skull Lesions (HD-20.1)

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Criteria

The majority of these are benign soft tissue or bony lesions easily defined by physical examination or with skull x-rays or ultrasound.

- Ultrasound is the initial imaging of scalp lesions
- X-ray is the initial imaging of skull (bony) lesions
- CT Head without or without and with contrast (CPT® 70450 or CPT® 70470) is considered medically necessary for the following scenarios:
  - Any lesion on physician examination and skull x-ray or ultrasound which is not clearly benign.
  - In cases where surgical planning is in progress, x-rays and/or ultrasound are not required.
  - When bony lesions are detected on physical examination with any of the following:
    - Signs or symptoms of Langerhan's cell histiocytosis
    - Signs or symptoms of multiple myeloma
    - History of a cancer condition with a suspicion of metastasis
    - History of Paget's disease
    - History of radiation therapy to the head region
- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary if there is concern for intracranial extension.
- See **Dental/Periodontal/Maxillofacial Imaging (HD-30.2)** for mandibular masses
- The following imaging is considered medically necessary for children and adults with Pott Puffy Tumor:
  - MRI Brain without and with contrast (CPT®70553) or CT Head without and with contrast (CPT® 70470)
  - Repeat imaging is considered medically necessary if requested by a neurologist, neurosurgeon, otolaryngologist (ENT) and/or oromaxillofacial surgeon (OMS) or any provider coordinating care with a neurologist, neurosurgeon, otolaryngologist (ENT) and/or oromaxillofacial surgeon (OMS)

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Background and Supporting Information

Pott Puffy Tumor is an abscess involving the frontal bone with adjacent osteomyelitis as the result of a frontal sinus infection that spreads contiguously through the wall of the sinus or through hematogenous spread via the veins that drain sinus mucosa.

Evidence Discussion (HD-20.1)

- The ACR Practice Parameter or the Performance of Computed Tomography (CT) of the head and of the extracranial head and neck gives a broad description of some of the pathologies that would be beneficially imaged using this modality, and points out that the reason for imaging must be for a valid medical reason and should be done with the aim for using only the minimum necessary radiation. This in some cases requires the use of additional modalities (ACR, 2021; ACR; 2020).
- The majority of skull lesions are benign, but advanced imaging characteristics may aid in defining the lesion as having a relatively high pretest probability of malignancy (prior to histological confirmation). However, clinical contextual information is necessary to help decide which individuals would benefit from advanced imaging including the individual's age and features of the individual's presenting history (Gomez et al., 2018).
- Ultrasound offers many radiographic advantages for the characterization of scalp masses, which are not visualized by CT or MRI, the primary goal being to differentiate benign vs. malignant scalp masses. Cancers of the scalp represent 2% of all skin cancers. In both squamous and basal cell carcinomas, the US shows hypoechoic solid tumors with increased vascularity, and basal cell pathology can also consist of hyperechoic spots internally (Wortsman et al., 2012).
- In folliculotropic mycosis fungoides (FMF), the most common manifestation of cutaneous T-cell lymphoma, the sonographic features include skin thickening, and hypoechoic upper dermis and hair follicles, with large surrounding hyperechoic deposits (Wortsman et al., 2012).
- Skull (bony) lesions are most often discovered incidentally either clinically or as a result of CT or MRI of the brain performed for another indication, and these skull masses can be either malignant or benign. The individual's history is essential to understand along with the imaging characteristics in order to obtain accurate diagnosis. Radiographic features, both CT- and MRI- specific can be used to differentiate between benign and malignant lesions, identifying whether lesions have well-defined borders, sclerotic margins, and a narrow transition zone.
- The presence of bony destruction is a useful observation, periosteal reaction, soft tissue component, and intracranial or extracranial extension can be identified as malignant features in addition, and patterns such as lytic vs. sclerotic, dingle vs multiple, homogeneous vs varied composition also can give helpful information for diagnosis, and various patterns are recognizable that may support the tissue type

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of origin such as fibrogenic, chondrogenic, osteogenic, vascular, etc. (Gomez et al., 2018).

- Plain radiograph can identify some of these features as a first diagnostic study, but advanced imaging may be necessary, in conjunction with x-ray, and at times CT and MRI are useful as complementary studies (Ugga et al., 2018).
- Pott puffy tumor is a rare complication of sinusitis or trauma, and early diagnosis is important since it is treatable with broad spectrum antibiotics, therefore advanced imaging is considered medically necessary with a clinical suspicion (Sharma et al., 2017).

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Skull Base Osteomyelitis (SBO) (HD-20.2)

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Criteria

- Note: SBO may occur from the temporal bones or paranasal sinuses and imaging should be of the region of origin
- Any of the following imaging studies are considered medically necessary in the diagnosis and treatment of skull base osteomyelitis and/or necrotizing external otitis:
  - MRI Brain without and with contrast (with IAC views) (CPT® 70553)
  - CT Temporal bone without contrast (CPT® 70480)
  - CT Temporal bone with contrast (CPT® 70481)
  - CT Maxillofacial without contrast (CPT® 70486)
  - CT Maxillofacial with contrast (CPT® 70487)
  - CT Neck with contrast (CPT® 70491)
  - CTA/CTV Head (CPT® 70496)
  - MRA/MRV Head, contrast as requested (CPT® 70544, 70545, 70546)
  - Gallium-67 Scan (CPT® 78800 or 78801, and 78803, 78831, 78830 or 78832)
  - Bone Scan (CPT® 78830 or 78832)
    - Skull base osteomyelitis: + Gallium and + Bone scan
    - Necrotizing otitis externa: + Gallium and - Bone scan
  - Indium WBC (CPT® 78800 or 78801, and 78803, 78831, 78830 or 78832) is considered medically necessary as a substitute for or used in addition to Gallium scanning to evaluate response to therapy and especially in cases that have undergone surgical debridement.
- Treatment response: Gallium-67 Scan every 4-6 weeks till scan is negative
- Surveillance Scanning: Gallium-67 Scan at 4 weeks and 3 months post-treatment
- For CT Head imaging, see **General Guidelines - CT Head (HD-1.4)** and/or **Headache (HD-11)**
- Internal Auditory Canal: (IAC) MRI can be reported as a limited study with one code from the set (CPT® 70540, CPT® 70542, or CPT® 70543), but should not be used in conjunction with MRI Brain codes (CPT® 70551, CPT® 70552, or CPT® 70553) if IAC views are performed as part of the brain.

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Background and Supporting Information

Skull base osteomyelitis is a rare complication of otitis externa. It occurs most commonly among the immunocompromised, older individuals (greater than 65 years of age) and members with diabetes.

MRI Brain will be positive earliest in the disease process. CT scans will best define bony destruction and are positive later in the disease process.

Evidence Discussion (HD-20.2)

- CT, although involves radiation, is more readily available and provides superior information regarding bony erosion and/or demineralization in the individual with suspected osteomyelitis (Treviño et al., 2021).
- MRI can assist with early detection of bone changes in as early as 3-5 days from onset of osteomyelitis (Treviño et al., 2021). In cases of diabetic osteomyelitis MRI provides a sensitivity of 90% and a specificity of 79%. MRI provides superior soft tissue detail and intracranial involvement secondary to its superior resolution when compared to CT for evaluation of skull-base osteomyelitis (Treviño et al., 2021; Álvarez et al., 2021; Kahn et al., 2022).
- Both nuclear imaging by means of Technetium 99m (^{99m}Tc) and Gallium 67 (^{67}Ga) scan can assist in localizing infection. The Gallium scan is often used to determine the resolution of the infection and thus the end of antibiotic therapy (Álvarez et al., 2021; Kahn et al., 2022). The Technetium 99m scan can be useful for detecting the infection however often times remains positive prolonged period of time, and thus should not be used to determine resolution of infection (Kahn et al., 2022).

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Cerebrovascular Disease (HD-21)

Guideline

Stroke/TIA (HD-21.1)
Risk Assessment for Extracranial Carotid Disease (HD-21.2)
Cryptogenic Stroke (HD-21.3)
Transient Global Amnesia (HD-21.4)
Moyamoya Syndrome/Disease (HD-21.5)
Sickle Cell Disease (HD-21.6)
Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations (HD-21.7)
Cerebral Venous Sinus Thrombosis (HD-21.8)
Evidence Discussion (HD-21)
References (HD-21)

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Stroke/TIA (HD-21.1)

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Criteria

Indications	Medically Necessary Imaging
• Acute ischemic stroke • Transient ischemic attacks (TIA) • Suspected hemorrhagic stroke • Suspected subdural hemorrhage	**ANY** or **ALL** of the following: • CT Head without contrast (CPT® 70450) • CTA Head (CPT® 70496) **AND/OR** CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session • CT Perfusion (CPT® 70472 or 70473) • MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) • MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549
Repeat imaging for follow-up and resolution of stroke or hemorrhage	• As requested by a neurologist, neurosurgeon, hematologist, or physiatrist (PM&R), or any provider in consultation with a neurologist, neurosurgeon, hematologist, or physiatrist
Contraindication to MRI	• CT Head without contrast (CPT® 70450) **OR** • CT Head without and with contrast (CPT® 70470)

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Indications	Medically Necessary Imaging
Arterial Vascular Imaging supported for TIA/Stroke evaluation including dissection: • Supported concurrently with brain imaging	• MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR** • CTA Neck (CPT® 70498) **OR** • CTA Head and Neck (CPT® 70471) if performed during the same session
Venous vascular imaging for evaluation of venous infarcts	• MRA/MRV ([CPT® 70544, CPT® 70545, or CPT® 70546]) **OR** • CTA/CTV Head (CPT® 70496) **AND/OR** • MRI Brain without contrast (CPT® 70551) • MRI Brain without and with contrast (CPT® 70553) **OR** • CT Head without contrast (CPT® 70450) Also see **Cerebral Venous Sinus Thrombosis (HD-21.8)**
Cervicocerebral Catheter Angiography for stroke evaluation	• 3D Rendering (CPT® 76377 or CPT® 76376)
Stroke in Pregnancy and other hypercoagulable states • See arterial and venous vascular imaging studies above for vascular imaging requests • See *Background and Supporting Information*	• MRI Brain without contrast (CPT® 70551) **OR** • CT Head without contrast (CPT® 70450)

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Indications	Medically Necessary Imaging
Amaurosis Fugax or Ocular Microembolism • May include optic nerve/retinal arterial or Hollenhorst plaques on exam	See above for TIA or New Stroke brain imaging options and vascular imaging
Reversible Cerebral Vasoconstriction Syndrome	See also **Sudden Onset of Headache (HD-11.3)**
Neurologic signs and/or symptoms, including headaches, associated with COVID-19 infection and/or COVID-19 vaccination (Ischemia may be arterial or venous)	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) See also **General Guidelines-CT head (HD-1.4)**, **Abnormal Blood Clotting (HD-11.9),** and **Neuro-Covid-19 (HD-14.2)**, and **Cerebral Venous Sinus Thrombosis (HD-21.8)**
Adults with HbSS (Sickle cell disease) or HbSb Thalassemia	One time MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) for screening to detect silent cerebral infarcts Follow-up or repeat testing per neurologist or hematologist or in consultation with a neurologist or hematologist See also **Sickle Cell Disease (HD-21.6)**
Secondary work-up of stroke/TIA	Transcranial Doppler Studies See **Transcranial Doppler CPT® 93886 (HD-24.8)**
Moyamoya Disease when surgery or other vascular intervention is being considered	See **Moyamoya Syndrome/Disease (HD-21.5)**
Evaluation of paradoxical venous thromboembolism in cryptogenic stroke with PFO	See **Acute deep venous thrombosis (DVT) (PVD-12.2)** and **Cryptogenic Stroke (HD-21.3)**

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Indications	Medically Necessary Imaging
Cerebral Amyloid Angiopathy (CAA)	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • CT Head without contrast (CPT® 70450) Amyloid-PET Brain (CPT® 78811 or CPT® 78814) is considered not medically necessary for stroke evaluation. See **Mild Cognitive Impairment (MCI) and Dementia - PET (HD-8.2)**
Multisystem Smooth Muscle Syndrome/ Smooth Muscle Dysfunction Syndrome	See **Multisystem Smooth Muscle Syndrome/Smooth Muscle Dysfunction Syndrome (HD-21.7)**

Background and Supporting Information

- Pregnancy is an independent risk factor for stroke. Additional risk factors are not required for assessment of a stroke/TIA with acute focal neurological deficits.
- Additional arterial and venous hypercoagulable states that impose a stroke risk include:
  - Antiphospholipid syndrome
  - Hyperhomocysteinemia
  - Factor V Leiden mutation
  - Prothrombin gene mutation
  - Protein S deficiency
  - Protein C deficiency
  - Anti-thrombin deficiency

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Risk Assessment for Extracranial Carotid Disease (HD-21.2)

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Criteria

- Duplex Ultrasound Carotid Arteries (CPT® 93880 or CPT® 93882) is considered medically necessary for the following:
  - Asymptomatic or symptomatic cervical bruits;
  - Clinical suspicion of extracranial carotid occlusion and the rationale is included
  - Pulsatile neck mass
  - Evaluation of blunt or penetrating neck trauma
  - Amaurosis fugax or ocular microembolism (optic nerve/retinal arterial or Hollenhorst plaques seen on exam)
  - Recent history of focal cerebral or ocular transient ischemic attacks
- Follow-up with CTA or contrast enhanced MRA
  - CTA and contrast enhanced MRA are comparable non-invasive imaging alternatives each with their own advantages and disadvantages
- For additional indications for Duplex Ultrasound Carotid Arteries
  - See **Initial Imaging (PVD-3.1)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines
- For repeat (Surveillance) Duplex Ultrasound Carotid Arteries (CPT® 93880 or CPT® 93882)
  - See **Surveillance Imaging with NO History of Carotid Surgery or Intervention (PVD-3.2)** and **Surveillance Imaging WITH History of Carotid Surgery or Intervention (PVD-3.3)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines.

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Cryptogenic Stroke (HD-21.3)

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Criteria

- 25% of individuals with ischemic stroke have no probable cause and is considered cryptogenic after a standard workup including an echocardiogram, inpatient cardiac telemetry or 24-Holter monitoring, CT or MRI Brain and vessel imaging of the brain or neck arteries and hematologic tests.
- A stroke may also be considered cryptogenic after a standard evaluation fails to yield an etiology in an individual less than 50 years of age without risk factors with more extensive testing.
- Most cryptogenic sources are embolic in etiology from venous or arterial sources with investigations from disturbances in coagulation and sources of embolism including patent foramen ovale (PFO) and paroxysmal atrial fibrillation.
- Specialized evaluation with the following documentation:
  - MRI/CT Brain with results of stroke
  - Results of MRA/CTA Head and Neck
  - TTE or TEE
  - 24-Hr Holter monitor or Inpatient cardiac telemetry and 12-Lead ECG
- Hematologic testing to include: CBC, Platelet count, INR, PT, PTT, D-Dimer and Arterial and Venous Hypercoagulability tests
  - MRA or CTA Pelvis for the evaluation of paradoxical venous thromboembolism with PFO
    - See **Acute Limb Swelling (PVD-12)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines.
  - Work-up for occult cancer, CT Chest, Abdomen, and/or Pelvis with contrast after the previously indicated tests with results are provided.
    - See **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.

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Transient Global Amnesia (HD-21.4)

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Criteria

- Transient Global Amnesia (TGA) is a clinical diagnosis with the differential diagnosis including, but not exclusive to: ischemic events, migraine headaches, and transient epileptic amnesia.
- Characteristics of TGA may include the following:
  - Inability to retain new information, lasting for several hours with preservation of alertness and all other cognitive functions with repetitive queries and amnesia
  - Witnessed episode
  - There must be anterograde amnesia during the attack
  - Cognitive impairment is limited to amnesia
  - No clouding of consciousness or loss of personal identity
  - No focal neurological signs/symptoms
  - No epileptic features
  - Attack must resolve within 24 hours
  - No recent head injury or active epilepsy
- Head and vessel imaging for ischemic etiology work-up should follow **Stroke/TIA (HD-21.1)**
- For suspected seizure, see **Epilepsy/Seizures (HD-9.1)**

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Moyamoya Syndrome/Disease (HD-21.5)

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Criteria

Initial imaging for Moyamoya Syndrome/Disease

- The imaging listed below is considered medically necessary for initial evaluation of Moyamoya Syndrome/Disease:
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **AND/OR**
  - MRA Neck (CPT® 70547, CPT® 70548 OR CPT® 70549) OR
  - CTA Head (CPT ® 70496) **OR**
  - CTA Neck (CPT ® 70498)
    - if performed in the same session, CTA Head and Neck (CPT® 70471)
- For complications related to Moyamoya see **Stroke/TIA (HD 21.1)** .

Repeat imaging for Moyamoya Syndrome/Disease

- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR** MRA Neck (CPT® 70547, CPT® 70548 or CPT® 70549) **OR**
  - CTA Head (CPT ® 70496) **OR**
  - CTA Neck (CPT ® 70498)
    - If performed in the same session, CTA Head and Neck (CPT® 70471)
  - Follow-up or repeat testing per neurologist, neurosurgeon, hematologist or in consultation with a neurologist, neurosurgeon, or hematologist.
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553)
  - Follow-up or repeat testing per neurologist, neurosurgeon, hematologist or in consultation with a neurologist, neurosurgeon, or hematologist.
- Radiopharmaceutical Localization Imaging SPECT (CPT® 78803, CPT® 78830 or CPT® 78832) with vasodilating agent acetazolamide (Diamox) challenge is supported when surgery or other vascular intervention is considered. Follow-up or repeat testing per neurologist, neurosurgeon, hematologist or in consultation with a neurologist, neurosurgeon, or hematologist.
- 3D Rendering (CPT® 76377 or CPT® 76376) with cerebral angiography is considered medically necessary to define the presence, location, and anatomy of intracranial and cervical vascular malformations.

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- See **General Guidelines – Other Imaging Situations (HD-1.7)** and in the Preface Imaging Guidelines

- CT Perfusion (CPT® 70472 or 70473) **OR** MRI Perfusion (CPT® 70551 OR CPT® 70552 OR CPT® 70553) is considered medically necessary for any of the following:
  - when requested by neurologist and/or neurosurgeon
  - prior to change in treatment
  - post-surgical

Screening imaging for Moyamoya Disease

- Screening is considered not medically necessary for Moyamoya Syndrome.
- Screening for Moyamoya Disease is considered medically necessary for:
  - First-degree relatives (biological parent, full sibling, or biological child) of individuals with Moyamoya Disease when requested by, or any provider in consultation with, a neurologist, geneticist, or neurosurgeon
- The imaging listed below is considered medically necessary for screening evaluation of Moyamoya Disease:
  - MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** Transcranial Doppler (TCD) Ultrasound (CPT® 93886 or CPT® 93888) (see **Transcranial Doppler (CPT® 93886) (HD-24.8)** in the Head Imaging Guidelines)
  - If MRA is contraindicated or not readily available, then CTA Head (CPT® 70496) is considered medically necessary

CT Perfusion (CPT® 70472 or 70473)

- Is considered medically necessary if requested by a neurologist, neurosurgeon or any provider coordinating care with a neurologist or neurosurgeon

MRI Perfusion

- MRI Perfusion may be obtained with MRI Brain (CPT® 70551 OR CPT® 70552 OR CPT® 70553)
  - No additional CPT® codes are considered medically necessary or appropriate to perform MRI perfusion.

Background and Supporting Information

Moyamoya disease (MMD) is a rare cerebrovascular disease characterized by progressive spontaneous bilateral occlusion of the intracranial internal carotid arteries (ICA) and their major branches (middle cerebral artery, MCA, and anterior cerebral artery, ACA) with compensatory capillary collaterals as an expression of pathologically increased angiogenic activity resembling a "puff of smoke" (Japanese: Moyamoya) on cerebral angiography. Moyamoya Disease is most prevalent individuals with East Asian

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ancestry. Up to 15% of individuals with Moyamoya Disease may have a family history of Moyamoya Disease.

Moyamoya Disease is distinguished from Moyamoya Syndrome (MMS). MMD is a primary disease process. MMS is a secondary process that occurs in response to another underlying pathological process that causes stenosis of intracranial blood vessels. There are two peaks of incidence with different clinical presentations, at around 10 years and 30-40 years. The peak appears to occur later in women than men. In children, ischemic symptoms, especially transient ischemic attacks, are predominant. Intellectual decline, seizures, and involuntary movements are also more common in this age group. In contrast, adult individuals present with intracranial hemorrhage more often than pediatric individuals.

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Sickle Cell Disease (HD-21.6)

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Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for the following:
  - Screening to detect silent cerebral infarcts
  - New symptoms or cognitive impairment occurs or a change in academic performance
  - Prior to evaluation for any change in therapy, including gene therapy and stem cell transplant
- MRA Head (CPT® 70544, CPT® 70545 OR CPT® 70546) **OR** CTA Head (CPT® 70496) is medically necessary for the following:
  - Any new, indeterminate, or equivocal findings on MRI Brain
  - Prior to evaluation for any change in therapy, including gene therapy and stem cell transplant

Background and Supporting Information

Individuals with sickle cell disease are at significantly increased risk for stroke and silent infarction, beginning at a very young age. Recent advances allow physicians to identify individuals at high risk for stroke and begin a primary stroke prevention program.

Identification of silent cerebral infarction is important because treatment with prophylactic red cell transfusions to maintain hemoglobin S levels at less than 30% of total hemoglobin may reduce recurrent stroke and extent of neurologic damage.

- Transcranial Doppler (TCD) for children aged 17 years old may be medically necessary on a case-by-case basis.
- See **Transcranial Doppler (CPT® 93886)(HD-24.8)** in the Head Imaging Guidelines for other indications for this modality and **Stroke/TIA (HD-21.1)** in the Head Imaging Guidelines.
- After 17 years old, for individuals with a history of abnormal TCDs, TCDs may be repeated every 3 months.
- TCD is considered not medically necessary for individuals with other phenotypes (Hgb SC, Hgb $S\beta^+$).

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Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations (HD-21.7)

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Criteria

Indications	Medically Necessary Imaging
Initial evaluation for confirmed ACTA2 mutation	• MRI Brain without and with contrast (CPT® 70553) with OR without MRI perfusion **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549)
Repeat imaging if requested by neurologist and/or neurosurgeon and/or geneticist and/or provider coordinating care with a neurologist and/or neurosurgeon and/or geneticist	• MRI Brain without and with contrast (CPT® 70553) with OR without MRI perfusion **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549)

- MRI Perfusion may be obtained with MRI Brain (CPT® 70551 OR CPT® 70552 OR CPT® 70553)

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- No additional CPT® codes are considered medically necessary to perform MRI perfusion.

- Because radiation is a known risk factor for development of moyamoya, MRI/MRA Head is recommended instead of Computed Tomography (CT)/CTA.
  - See *Background and Supporting Information*
- Conventional catheter angiogram 3D rendering (CPT® 76376 or CPT® 76377) should be reserved for individuals with focal neurologic symptoms or evidence on MRA or transcranial Doppler (TCD) of critical or progressive narrowing of the cerebral arteries.
  - See **Screening for Suspected Peripheral Artery Disease/Aneurysmal Disease (PVD-2)**

Background and Supporting Information

Smooth muscle dysfunction syndrome (SMDS)/Multisystemic smooth muscle syndrome (MSMS) presents with a recognizable pattern of complications, including congenital mydriasis, patent ductus arteriosus (PDA), pulmonary arterial hypertension, aortic and other arterial aneurysms, moyamoya-like cerebrovascular disease, intestinal hypoperistalsis and malrotation, and hypotonic bladder.

SMDS/MSMS is caused by heterozygous mutations of the ACTA2 altering arginine 179, most commonly p.Arg179His. With a single exception, all cases are due to de novo mutations.

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Cerebral Venous Sinus Thrombosis (HD-21.8)

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Criteria

CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography):

- If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code is used to report both procedures.
- If an arterial CTA or MRA study has been performed and subsequently a repeat study is needed to evaluate the venous anatomy, then this study is considered medically necessary.
- If a venous CTV or MRV study has been performed and subsequently a repeat study is needed to evaluate the arterial anatomy, then this study is conisdered medically necessary.

Indications	Medically Necessary Imaging
Venous vascular imaging for evaluation of venous infarcts	MR or CT Venography: • MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** • CTV Head (CPT® 70496)
Suspected cerebral venous thrombosis	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • CT Head without contrast CPT® 70450 **AND/OR** • MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** • CTV Head (CPT® 70496)

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Indications	Medically Necessary Imaging
Follow up of known cerebral venous sinus thrombosis	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • CT Head without contrast (CPT® 70450) **AND/OR** • MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** • CTV Head (CPT® 70496)
To differentiate total from subtotal occlusion	MRA without and with contrast (CPT® 70546)

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Evidence Discussion (HD-21)

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- Guidelines from the American Heart Association (AHA) and American Stroke Association supported the role of neuroimaging in stroke triage and individual selection for endovascular therapy in the management of acute stroke (Expert panel on Neurological Imaging et al., 2023; Powers et al., 2019; Duvekot, 2021). Current AHA guidelines also recommended non-invasive imaging of the carotid arteries for individuals with TIA or stroke who may be candidates for carotid endarterectomy or stenting (Expert Panel on Neurological Imaging et al., 2023, Powers et al., 2019). This includes CT Angiography (CTA) of the head and neck or MR Angiography (MRA) of the head and neck.
- For clinically suspected stroke, initial imaging includes CT head to exclude intracranial hemorrhage, exclude other structural causes and assess for early ischemic changes (Expert Panel on Neurological Imaging et al., 2023). CT Angiography (CTA) head is considered medically necessary during the initial evaluation to assess for large vessel occlusion and has high sensitivity of 93% and specificity of 100% (Expert Panel on Neurological Imaging et al., 2023; Nickel & Kamani, 2018). CTA neck is also a rapid modality for imaging the extracranial vasculature to identify carotid stenosis, occlusion, and vertebral-basilar disease (Expert Panel on Neurological Imaging, et al., 2023).
- CT Perfusion (CTP) can identify individuals with large vessel occlusion who may be candidates for endovascular therapy in the acute stroke setting.
- A CT stroke protocol that includes unenhanced CT, CTA head, and CTP has effective radiation doses between 10-15 mSvm, with newer generation scanners and optimized sequences with lower radiation doses closer to 2 mSv (Arnold & Bousser, 2005).
- MRI Brain with Diffusion Weighted Imaging (DWI) is the most sensitive test to detect an acute ischemic infarct, with a sensitivity of 94% and a specificity of 97% (Expert Panel on Neurological Imaging et al., 2023; Powers et al., 2019, de Oliveira et al., 2021, Chalela et al., 2007).
- MR Angiography (MRA) Head and Neck is an alternative to CTA for identification of vascular lesions in the setting of a stroke evaluation.(Pannell 2023) Diagnostic cervicocerebral catheter angiography has the highest spatial and temporal resolution of any vascular imaging study, however, is invasive and requires use of contrast (Expert Panel on Neurological Imaging, et al., 2023).
- Compared with CT, a full stroke protocol with MRI is longer to acquire and susceptible to motion artifacts, in addition to contraindication with metallic devices, and certain implants (Duvekot et al., 2021). MRI, however, does have the advantage of increased sensitivity for acute ischemia, including in transient ischemic attack, and does not require radiation.

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- In the delayed stroke evaluation, CT Head may identify complications such as hemorrhagic conversion, mass effect and herniation (Duvekot et al., 2021). MRI Brain in this scenario can confirm the extent of an ischemic stroke, evaluate for underlying pathology, and identify any complications (Duvekot et al., 2021).
- For clinically suspected transient ischemic attack (TIA), CT Head is useful to exclude hemorrhage and other intracranial abnormalities (Expert Panel on Neurological Imaging et al., 2023). CT perfusion can identify abnormalities in the setting of TIA in up to one-third of cases (Expert Panel on Neurological Imaging, et al., 2023). CT Angiography (CTA) Head and Neck is a rapid modality for evaluating intracranial and extracranial vascular lesions (Expert Panel on Neurological Imaging et al., 2023). MRA Head and neck is an alternative modality, preferred in those with renal impairment and iodine contrast allergy (Expert Panel on Neurological Imaging et al., 2023). MRI Brain is the most sensitive modality for acute ischemic infarct (Expert Panel on Neurological Imaging et al., 2023). MRI Brain with Diffusion Weighted Imaging (DWI) sequences can identify ischemic changes in approximately 40% of individuals with TIA (Mullins et al., 2002).
- For clinically suspected venous sinus thrombosis, imaging is considered medically necessary to identify the clot and assess for complications, such as venous infarction or hemorrhagic transformation. In addition to imaging previously reviewed for the stroke protocol, CT Venogram (CTV) or MR Venogram (MRV) are appropriate to localize the clot within the venous system (Expert Panel on Neurological Imaging et al., 2023).
- For stroke or hemorrhage related to Cerebral amyloid angiopathy (CAA), Amyloid PET Brain has a sensitivity that ranges from 82% to 91%, however, its specificity is poor, ranging from 44% to 55%; therefore, this modality is not recommended (McCarter et al., 2021).

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Cerebral Vasculitis (HD-22)

Guideline

Cerebral Vasculitis (HD-22.1)
References (HD-22)

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Cerebral Vasculitis (HD-22.1)

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Criteria

- When CNS vasculitis is suspected, MRI Brain without and with contrast (CPT® 70553) is considered medically necessary
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR**
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549); **OR**
  - CTA Head (CPT® 70496) **AND/OR**
  - CTA Neck (CPT® 70498) **OR**
  - CTA Head and Neck (CPT® 70471) if performed during the same session
  - The above studies are considered medically necessary concurrently with brain imaging
- Primary CNS vasculitis includes Giant Cell Arteritis also known as Temporal Arteritis (see **New Headache Onset Older than Age 50 (HD-11.7)**)
- If initial vascular imaging is suspicious for vasculitis, 3D rendering (CPT® 76377 or CPT® 76376) with cervicocerebral angiography/arteriography (see **General Guidelines- Other Imaging Situations (HD-1.7)**)
- Transcranial Doppler Studies for individuals with documented vasculitis or concern for vasospasm (see **Transcranial Doppler (CPT® 93886) (HD-24.8)**)
- FDG-PET/CT Brain (CPT® 78608) is considered not medically necessary due to lack of peer reviewed literature or expert consensus supporting the study for vasculitis.
- For extra-cranial giant cell arteritis evaluation (see **Giant Cell Arteritis (PVD-6.9.2))**

Background and Supporting Information

The diagnosis of primary central nervous system vasculitis is challenging because of its nonspecific and varied symptoms. Central nervous system vasculitis typically presents with headache, followed by encephalopathy and behavioral changes. Focal neurologic deficits, including but not limited to, visual loss, unilateral weakness, language impairment, sensory loss, incoordination, occur in 20% to 30% of individuals. Seizures and intracranial hemorrhage may also occur. With a strong clinical suspicion, brain imaging is important for supporting the diagnostic process and directing biopsy.

Classification of vasculitides based on vessel size adapted from Younger. MRA and CTA are useful for the evaluation of the large proximal arteries; evaluation of a possible small vessel vasculitis may be beyond the resolution of routine MRA and CTA Head. However, other abnormalities, such as atherosclerotic disease, arterial dissection, Moyamoya disease, or reversible cerebral vasoconstriction may be demonstrated. Conventional

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angiogram is superior to MRA and CTA in demonstrating abnormalities in smaller vessels and is considered the "gold standard" in the evaluation of primary small vessel CNS vasculitis.

Dominant Vessel Involved	Primary	Secondary
Large arteries	• Giant cell arteritis • Takayasu's arteritis	Aortitis with rheumatoid disease; Infection (e.g., syphilis)
Medium arteries	• Classical polyarteritis nodosa • Kawasaki disease	Infection (e.g., hepatitis B)
Small vessels and medium arteries	• Wegener's granulomatosis • Churg–Strauss syndrome • Microscopic polyangiitis	Vasculitis with rheumatoid disease, systemic lupus erythematosus (lupus cerebritis), Sjögren's syndrome, drugs, infection (e.g., HIV)
Small vessels	• Henoch-Schönlein purpura • Essential cryoglobulinemia • Cutaneous leukocytoclastic vasculitis	Drugs (e.g., sulphonamides, etc.) Infection (e.g., hepatitis C)

Evidence Discussion (HD-22)

- Non-invasive neuroimaging modalities play a role in the diagnostic evaluation of central nervous vasculitis by providing supportive imaging findings and guiding biopsy (Salmela et al., 2017; Ledbetter et al., 2021). The preferred modality for the evaluation of central nervous system vasculitis is MRI, which provides superior soft-tissue resolution (Ledbetter et al., 2021). MRI Brain is abnormal in greater than 95% of individuals with CNS vasculitis (Wahed & Cho; 2023). MRI Brain shows infarcts in up to 50% of cases and white matter hyperintensities in 42% of cases (Salmela et al., 2017; Ledbetter et al., 2021).
- MRA Head was found to be abnormal in 81% of individuals with angiographic findings of vasculitis and normal in 100% of individuals with a normal angiogram (Ledbetter et al., 2021).
- CT Angiography is an alternative non-invasive modality that also provides visualization of blood vessels (Salmela et al., 2017; Ledbetter et al., 2021; Wahed & Cho, 2023).

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- FDG-PET/CT brain is not considered medically necessary due to the high physiologic FDG uptake in the brain and limited resolution of the camera system. Atherosclerosis may also interfere with the FDG-PET interpretation.

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References (HD-22)

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Dizziness, Vertigo and Syncope (HD-23)

Guideline

Dizziness/Vertigo (HD-23.1)
Syncope (HD-23.2)
References (HD-23)

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Dizziness/Vertigo (HD-23.1)

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Criteria

Indications	Medically Necessary Imaging
Red Flags: • History of malignancy • Associated symptoms: ◦ Headache ◦ Hearing loss ◦ Unilateral tinnitus ◦ Visual disturbances ◦ Drop attacks ◦ Vestibular migraine ◦ Weakness • Duration of episode: ◦ Episodes lasting hour(s) or continuous • Exam findings: ◦ Inconclusive positional testing or equivocal or unusual nystagmus findings (Negative Dix-Hallpike) ◦ Visual disturbances including loss and diplopia ◦ Hearing loss ◦ Abnormal cranial nerve findings ◦ Ataxia ◦ Positive Romberg sign ◦ Absent head thrust sign ◦ Focal neurologic deficits ◦ Dysarthria ◦ Weakness, including unilateral or hemibody weakness • Failed treatment: ◦ Failure to respond to vestibular therapy or unable to participate due to clinical condition • Abnormal test results: ◦ ENG/VNG results support central cause	• MRI Brain without contrast (CPT 70551) **OR** • MRI Brain without and with contrast (CPT 70553) **OR** • CT Head without contrast (CPT 70450) If MRI contraindicated: • CT Head without contrast (CPT 70450) **OR** • CT Head without and with contrast (CPT 70470) See also: • **Headaches with Red Flags (HD-11.2)** • **Multiple Sclerosis and Related Conditions (HD-16)** • **Brain Metastases (ONC-31.3)**

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Indications	Medically Necessary Imaging
Stroke/TIA	See **Stroke/TIA (HD-21.1)**
Acoustic Neuroma/Vestibular Schwannoma	• MRI Brain without and with contrast (with IAC views) (CPT® 70553) **OR** without contrast (CPT® 70551) • Limited MRI of the internal auditory canals (CPT® 70540, CPT® 70542, OR CPT® 70543) when requested by the provider in place of a complete MRI Brain See also • **Acoustic Neuroma (HD-33.1)** • **Peripheral Nerve Sheath Tumors (PN-9.1)**
Head trauma/Temporal Bone Fracture/ Post-traumatic vertigo	• CT Head without contrast (CPT® 70450) ◦ See **Head Trauma (HD-13.1)** **AND/OR** • CT Orbit/Temporal bone without contrast (CPT® 70480)

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Indications	Medically Necessary Imaging
Vertebrobasilar disease/ Vertebrobasilar Insufficiency/ Dissection	• CTA Head (CPT® 70496 **AND/OR** • CTA Neck (CPT® 70498) **OR** • CTA Head and Neck (CPT® 70471) if performed during the same session **OR** • MRA Head (CPT® 70544, CPT® 70545, OR CPT® 70546) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548, or CPT®70549) See also: • **General Guidelines - CT and MR Angiography (CTA/ CTV and MRA/MRV) (HD-1.5)** • **Headache and Suspected Vascular Dissection (HD-11.1)** • **Intracranial Cerebral Aneurysms (HD-12.1)**
Semicircular canal dehiscence	• CT Orbit/Temporal bone without contrast (CPT® 70480)

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Indications	Medically Necessary Imaging
Meniere's Disease	• MRI Brain without and with contrast (with IAC views) (CPT® 70553) **OR** without contrast (CPT® 70551) • Limited MRI of the internal auditory canals (CPT® 70540, CPT® 70542, OR CPT® 70543) when requested by the provider in place of a complete MRI Brain

Background and Supporting Information

- Dizziness, a common complaint, with benign and dangerous causes, may be continuous, triggered, or spontaneous.
- For the continuously dizzy individual with nystagmus at the time of evaluation, a head impulse test and a test of skew should be performed to determine if dizziness is due to a peripheral cause or a posterior circulation stroke. Abnormalities on exam may be indications for imaging as detailed in the guideline.
- For triggered dizziness, positional testing such as the Dix-Hallpike maneuver, and/or orthostatic blood pressure measurements, should be performed. If symptoms are reproduced on examination, triggered dizziness is confirmed.
- Spontaneous dizziness may be due to vestibular migraine, TIA, or Meniere's disease, among other causes. A detailed neurologic examination should be performed, and imaging as detailed in the guideline.
- The Dix-Hallpike maneuver should be performed or the individual should be referred to a clinician who could perform the procedure if Benign Paroxysmal Positional Vertigo (BPPV) is suspected.
- The Head Impulse Test (HIT) is also known as the Head thrust test. It is designed to evaluate the vestibular-ocular reflex in an individual with concern for a peripheral vestibulopathy due to ACUTE spontaneous vertigo. The individual is instructed to look at the examiner during the entire test. The individual's head is then quickly turned or rotated to one side and then the other. If normal, the individual's eyes should remain locked on the examiner. If abnormal, the eyes will move in the direction of the head rotation and then quickly correct. This saccade indicates peripheral vestibular hypofunction on the side of the direction that the head is turned. The HIT test is

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abnormal in individuals with vestibular neuronitis, and normal in individuals with a posterior circulation stroke.

- Posterior Canal BPPV (85%-95% of BPPV cases) is defined as:
  - Individual reports repeated episodes of vertigo with changes in head position relative to gravity.
  - Each of the following criteria is fulfilled on physical exam:
    - Vertigo associated with torsional (rotatory), upbeating (toward the forehead) nystagmus is provoked by the Dix-Hallpike test.
    - There is a latency period between the completion of the Dix-Hallpike maneuver and the onset of vertigo and nystagmus.
    - The provoked vertigo and nystagmus increase and then resolve within 60 seconds from the onset of the nystagmus.
- Lateral or Horizontal Canal BPPV (5%-15% of BPPV cases) will have horizontal or no nystagmus to which a supine roll test assesses for this condition.
- Exclusions for Dix-Hallpike maneuver
  - Individual previously diagnosed with BPPV and who on date of encounter in calendar year does not have positional dizziness or vertigo consistent with active BPPV
  - Individual has declined Dix-Hallpike maneuver
  - Individual has cervical spinal disease (i.e., cervical stenosis, severe kyphoscoliosis, limited cervical range of motion, Down's syndrome, severe rheumatoid arthritis, cervical radiculopathies, Paget's disease, ankylosing spondylitis, low back dysfunction, spinal cord injuries, spinal fractures)
  - Individual unable to lay flat (i.e., severe heart disease)
  - Individual has severe atherosclerotic disease or recent dissection involving the anterior or posterior cerebral circulation
  - Unable to be seated in exam chair (i.e., morbidly obese), or maneuver cannot be safely performed given morbid obesity
  - Ehlers Danlos/Marfans/Connective tissue disorder due to risk of cranio spinal instability/dissection
- Triggered episodic vestibular syndrome (t-EVS) usually last seconds to minutes with the most common triggers (vs. exacerbating factors) are head motion or change in body position. In the Emergency Department, benign paroxysmal positional vertigo (BPPV) is the second most common cause of t-EVS after orthostatic hypotension. Far lateral rotation of the neck leads to mechanical occlusion of one or both vertebral arteries causing temporary symptoms of vertigo and nystagmus when this position is maintained and may occur with the individual upright.
- Diagnoses or conditions associated with orthostatic hypotension (OH) or nOH include: Parkinson Disease (PD), Multiple System Atrophy (MSA), Pure Autonomic

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Failure (PAF) or Dementia with Lewy Bodies (DLB), unexplained fall or syncope, peripheral neuropathies secondary to diabetes, amyloidosis and HIV, individuals 70 years of age and older and frail and on multiple medications and individuals with postural (orthostatic) dizziness or nonspecific symptoms that occur when standing. Symptoms may include: lightheadedness or dizziness, the sensation of blacking out, cognitive dysfunction, mental dulling, generalized weakness, neck pain or discomfort in the suboccipital and paracervical region (coat hanger) or platypnea (dyspnea while standing).

- Secondary or advanced laboratory testing is considered for use in select individuals for paraneoplastic syndromes (paraneoplastic panel) and serum and urine protein electrophoresis for monoclonal gammopathy for peripheral neuropathy.
  - See **Polyneuropathy (PN-3.1)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines, **Multiple Myeloma and Plasmacytomas (ONC-25)** in the Oncology Imaging Guidelines, and **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.
- Semicircular canal dehiscence (SCD) is a rare syndrome caused by dehiscence in the boney covering of the affected superior, posterior or lateral semicircular canal. When present, it can result in vestibular symptoms of vertigo associated with auditory symptoms including oscillopsia evoked by noise and conductive hearing loss. The vestibular symptoms in SCD can be debilitating. Individuals may note that loud noises cause them to see things moving or that they experience a similar sensation when they cough, sneeze, or strain to lift something heavy. The signs of vestibular abnormalities in SCD relate directly to the effect of the dehiscence which has created a third mobile window of the inner ear. Some individuals have a conductive hearing loss for low-frequency sounds that can resemble the pattern in otosclerosis.
- Occlusive carotid artery disease does not cause fainting but rather causes focal neurologic deficits such as unilateral weakness. Thus, carotid imaging will not identify the cause of the fainting and increases cost. Fainting is a frequent complaint, affecting 40% of people during their lifetime.

Evidence Discussion (HD-23.1)

- MRI Brain is the preferred initial imaging modality for evaluation of persistent vertigo, vertigo associated with an abnormal neurologic exam, and vertigo due to a suspected central cause (Wang et al., 2023; ACR 2024).
- CT Head is not recommended for the initial evaluation of dizziness due to inferior soft tissue resolution when compared to MRI Brain. In addition, MRI Brain provides better visualization of the cerebellum and posterior fossa and is more sensitive for the detection of posterior fossa infarcts. For suspected superior semicircular canal dehiscence, CT Temporal bone is the appropriate initial imaging study (Wang et al., 2023).

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- In the evaluation of dizziness or vertigo in the emergency department, the positivity rate of CT Head was 2%, for MRI Brain 4%, with the diagnostic yield increasing to 12% for MRI Brain if neurologic findings were present (Wang et al., 2023).
- For dizziness due to suspected vertebral-basilar insufficiency, MRA sensitivity reaches 97% when performed with contrast-enhancement (Wang et al., 2023).
- For suspected vertebral artery dissection, CTA had the highest sensitivity 100%, followed by MRA 77%, and Doppler ultrasound at 71% (Wang et al., 2023).
- Vascular imaging should include the entire vertebral artery from the origin at the aortic arch to the basilar artery (Wang et al., 2023).

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Syncope (HD-23.2)

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Criteria

Indications	Medically Necessary Imaging
Syncope with focal signs of a neurologic deficit **OR** Syncope without focal signs of a neurological deficit AND negative or inconclusive Electrocardiogram (EKG)	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • CT Head without contrast (CPT® 70450) **AND/OR** • CTA Head (CPT® 70496) **OR** • MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR** • CTA Neck (CPT® 70498) **OR** • MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
Recurrent syncope with risk of head injury or head trauma related to syncope	See **Head Trauma (HD-13.1)**
Situational syncope, including precipitating factors to syncope such as coughing, defecation, eating, laughing, or urination Myoclonic jerks without symptoms or signs associated with seizure, including but not limited to prolonged amnesia/confusion, tongue biting.	Advanced imaging is considered not medically necessary

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Indications	Medically Necessary Imaging
Loss of consciousness with other symptoms or signs of seizure, including but not limited to, prolonged amnesia/ confusion, tongue biting, and/or urinary incontinence.	See **Epilepsy/Seizure (HD-9.1)**

Evidence Discussion (HD-23.2)

- The Choosing Wisely Campaign Best Practices, supported by the American College of Emergency Physicians, American College of Physicians, and the American Academy of Neurology recommended against neuroimaging in the evaluation of simple syncope and a normal neurologic evaluation (Runser et al., 2017, Expert Panels on Cardiac Imaging and Neurological Imaging et al., 2021).
- The initial evaluation for individuals with syncope includes a detailed history, physical exam, and electrocardiography (Runser et al., 2017; Shen et al., 2017; Expert Panels on Cardiac Imaging and Neurological Imaging et al., 2021; Langer-Gould et al., 2013; Bayard et al., 2023). Neuroimaging has a low diagnostic yield of 5% to 6.4% of an acute abnormality on CT Head (Runser et al., 2017; Expert Panels on Cardiac Imaging and Neurological Imaging et al., 2021; Mitsunaga & Yoon, 2015). Clinical factors associated with abnormal scans include head trauma or a focal neurologic deficit on exam (Runser et al., 2017; Expert Panels on Cardiac Imaging and Neurological Imaging et al., 2021; Mitsunaga & Yoon, 2015).
- In select cases when neuroimaging is considered medically necessary, structural brain imaging with either CT Head or MRI Brain may be useful, along with vascular imaging, depending on the suspected underlying pathology (Expert Panels on Cardiac Imaging and Neurological Imaging et al., 2021; Bayard et al., 2023).
- Inappropriate imaging studies may identify incidental findings, incorrectly assumed to be the cause of syncope, leading to further delay in the identification of the true cause and risk additional unnecessary procedures (Langer-Gould et al., 2013).
- Situational syncope does not require advanced imaging (Cheshire, 2017; Shen et al., 2017; Cutsforth-Gregory, 2020).

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Other Imaging Studies (HD-24)

Guideline

Transcranial Magnetic Stimulation (TMS) (HD-24.1)
Functional MRI (fMRI) (HD-24.2)
Magnetic Resonance Spectroscopy (MRS) (HD-24.3)
CSF Flow Imaging (HD-24.4)
CT or MRI Perfusion (HD-24.5)
Magnetic Resonance Neurography (MRN) (HD-24.6)
Cone Beam Computed Tomography (CBCT) (HD-24.7)
Transcranial Doppler (CPT® 93886) (HD-24.8)
Evidence Discussion (HD-24)
References (HD-24)

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Transcranial Magnetic Stimulation (TMS) (HD-24.1)

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In TMS, an electromagnetic coil placed on the surface of the skull overlying the motor cortex depolarizes the motor axons, creating a motor evoked potential (MEP), which is recorded via superficial skin electrodes as it passes through the upper and lower motor pathways to an innervated muscle.

TMS is typically utilized for behavioral health purposes.

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Functional MRI (fMRI) (HD-24.2)

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Criteria

- fMRI is useful in pre-operative scenarios to define the “eloquent” areas of brain
  - The ordering physician must be a neurologist, neurosurgeon or radiation oncologist or any provider in consultation with one of these specialists.
- Primary medically necessary indications for fMRI include, but are not limited to, the following:
  - Assessment of intracranial neoplasm and other targeted lesions
  - Pre-surgical planning and operative risk assessment
  - Assessment of eloquent cortex (e.g., language, sensory, motor, visual centers) in relation to a tumor or another focal lesion
  - Surgical planning (biopsy or resection)
  - Therapeutic follow-up, as a one-time, post-operative, follow- up study
  - Evaluation of preserved eloquent cortex
  - Assessment of eloquent cortex for epilepsy surgery
  - Assessment of radiation treatment planning and post-treatment evaluation of eloquent cortex
- fMRI is considered medically necessary with PET Brain in epilepsy surgery planning
- Procedure codes for functional MRI:
  - CPT® 70554 MRI Brain, functional MRI, including test selection and administration of repetitive body part movement and/or visual stimulation, not requiring physician or psychologist administration
  - CPT® 70555 MRI Brain, functional MRI; requiring physician or psychologist administration of entire neurofunctional testing
  - If MRA Head (CPT® 70544) is considered medically necessary but Functional MRI (CPT® 70554 or CPT® 70555) was erroneously ordered, then CPT® 70544 may be substituted when appropriate
- MRI Brain (CPT® 70551 or CPT® 70553) and/or fMRI (CPT® 70554 or CPT® 70555) are considered medically necessary concurrently
  - See **Unlisted Procedures/Therapy Treatment Planning (Preface-4.3)** in the Preface Imaging Guidelines if MRI Unlisted is requested for surgical planning

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Magnetic Resonance Spectroscopy (MRS) (HD-24.3)

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Criteria

- MRS (CPT® 76390) involves analysis of the levels of certain chemicals in a pre-selected voxels (small regions) on an MRI scan done at the same time.
- When conventional imaging by magnetic resonance imaging (MRI) or computed tomography (CT) provides limited information regarding specific clinical questions, indications for MRS in adults and children include **ONE** of the following:
  - Distinguish recurrent brain tumor from radiation necrosis as an alternative to PET (CPT® 78608)
  - Diagnosis of certain rare inborn errors of metabolism affecting the CNS (primarily pediatric individuals)
  - Evidence or suspicion of primary or secondary neoplasm (pre-treatment and post-treatment)
  - Grading of primary glial neoplasm, particularly high-grade versus low-grade glioma
  - Evidence or suspicion of brain infection, especially cerebral abscess (pre-treatment and post-treatment) and HIV-related infections
  - Seizures, especially temporal lobe epilepsy

Background and Supporting Information

- Evaluation of certain primary brain tumors where diagnostic accuracy has been established in peer-reviewed literature.
  - See **Primary Central Nervous System Tumors – General Considerations (ONC-2.1)**, **Low Grade Gliomas (ONC-2.2)**, and **High Grade Gliomas (ONC-2.3)** in the Oncology Imaging Guidelines

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CSF Flow Imaging (HD-24.4)

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Criteria

- Pulse-gated MRI imaging or MRI CINE is generally performed as a part of an MRI Brain study. It is not coded separately for pre-operative evaluation of hydrocephalus, Chiari syndromes, Normal Pressure Hydrocephalus, Idiopathic Intracranial Hypertension (also known as pseudotumor cerebri), and spontaneous intracranial hypotension.
- There is no specific or unique procedure code for this study; it is done as a special sequence of a routine MRI Brain without contrast (CPT® 70551).
- If not previously performed as part of recent study, a second study for the purpose of evaluating CSF flow is considered medically necessary.

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CT or MRI Perfusion (HD-24.5)

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Criteria

- Performed as part of a CT Head or MRI Brain examination in the evaluation of individuals with very new strokes or brain tumors.
- CT perfusion study is coded as either CPT® 70472 or CPT® 70473
- CPT® 70472, CT cerebral perfusion analysis with contrast material, including imaging postprocessing, performed with concurrent CT or CT angiography of the same anatomy, (use in conjunction with 70450, 70460, 70470, 70471, 70496).
- CPT® 70473, CT cerebral perfusion analysis with contrast, without concurrent CT or CTA of same anatomy, with postprocessing.
  - CTA Head and/or Neck is considered medically necessary in conjunction with the CT Perfusion study (CPT® 70472)
- CPT® 70472 or 70473 - cerebral perfusion analysis using CT is considered medically necessary for the following:
  - Evaluation of acute stroke (<24 hours) to help identify individuals with stroke-like symptoms and to help identify those most likely to benefit from thrombolysis or thrombectomy
  - Follow-up for acute cerebral ischemia or infarction and/or reperfusion in the subacute or chronic phase of recovery
  - To assist in planning and evaluating the effectiveness of therapy for cervical or intracranial arterial occlusive disease (as an isolated test or in combination with a cerebrovascular reserve challenge) and/or chronic cerebral ischemia
  - Identifying cerebral hyperperfusion syndrome following revascularization
  - Evaluation of the vascular status of solid tumors where MRI is degraded due to susceptibility artifact from air-containing spaces, surgical clips, or dental work
  - Follow-up of tumor response to therapy
- See also **General Guidelines – CT and MR Angiography (CTA/CTV and MRA/MRV) (HD-1.5)**, and **Stroke/TIA (HD-21.1)**
- MRI Perfusion is obtained with MRI Brain (CPT® 70551 OR CPT® 70552 OR CPT® 70553).
  - No additional CPT® codes are considered medically necessary to perform MRI perfusion.
- Medically necessary indications for perfusion magnetic resonance imaging (MRI) MRI Perfusion (CPT® 70551 OR CPT® 70552 OR CPT® 70553)[9] include the following:
  - Diagnosis and Characterization of Mass Lesions

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        - Differential diagnosis (tumor versus tumor mimic)
        - Diagnosis of primary neoplasms (may include grading)
        - Surgical planning (biopsy or resection)
        - Targeting locations for biopsy
        - Guiding resection extent
    - Therapeutic follow-up
        - Radiation necrosis versus recurrent or residual tumor
        - Chemonecrosis versus recurrent or residual tumor
        - Pseudoprogression and pseudoresponse
        - Monitor potential transformation of non-resectable low-grade neoplasms to higher grade
    - Assessment of Neurovascular Disease
        - Acute stroke (assessment of ischemic penumbra)
        - Assessment of the hemodynamic significance of cervical or intracranial vascular stenosis
        - Assessment of cervical or intracranial revascularization efficacy
        - Assessment of vasospasm
- Other indications are usually considered not medically necessary.

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Magnetic Resonance Neurography (MRN) (HD-24.6)

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- See **Magnetic Resonance Neurography (MRN) (PN-7.1)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.

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Cone Beam Computed Tomography (CBCT) (HD-24.7)

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- CPT® Codes: CPT® 70486, CPT® 70487, CPT® 70488, CPT® 70480, CPT® 70482 (No separate 3D rendering codes should be reported)
- An alternative to traditional CT imaging is in-office cone beam testing and possible decreased radiation dosage. The indications for office-based CT imaging are the same as for traditional scanners, and they should not be used for diagnosing or managing uncomplicated acute bacterial rhinosinusitis (ABRS).
- See **Temporomandibular Joint Disease (TMJ) (HD-30.1)** and **Dental/Periodontal/ Maxillofacial Imaging (HD-30.2)**

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Transcranial Doppler (CPT® 93886) (HD-24.8)

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Criteria

- Transcranial Doppler (TCD) is a non-invasive ultrasonic technique that measures local blood flow velocity and direction in the proximal portions of intracranial and extracranial arteries

CPT® Code	Description	Additional Notes
93886	Transcranial Doppler study of the intracranial arteries; complete study	
93888	Transcranial Doppler study of the intracranial arteries; limited study	
93892	Transcranial Doppler study of the intracranial arteries; emboli detection without intravenous microbubble injection	
93893	Transcranial Doppler study of the intracranial arteries; venous-arterial detection with intravenous microbubble injection	Report 93893 if the study is performed with intravenous microbubble injection. Transcranial Doppler studies described as “with contrast” are performed with intravenous microbubble injection. The bubbles serve to enhance ultrasound thus enabling better visualization of the intracranial arteries.

- Transcranial Doppler studies are ordered either as a single complete or limited study or as a combination of the complete or limited study with additional studies for further evaluation of the condition being investigated.

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- Evaluation of Stroke/TIA usually includes CPT® 93886 (Vasoreactivity study) and either CPT® 93892 or CPT® 93893 (Emboli detection).
  - Examples include:
    - Evaluation of right to left cardiac shunts: Detection of microemboli in individuals with stroke or TIA. (CPT® 93892 or CPT® 93893 added to CPT® 93886)
    - Evaluation of intracranial occlusive disease in individuals with documented stroke or TIA
    - Evaluation of hemodynamic effects of known severe extra-cranial occlusive disease
- TCD studies are considered medically necessary for the following:
  - Evaluation of severe stenosis or occlusion of the extracranial (greater than 60% diameter reduction) and major basal intracranial arteries (≥50% diameter reduction)
  - Detection and serial evaluation of cerebral vasospasm in subarachnoid hemorrhage
  - Evaluation of cerebral embolization including in COVID-19 and refractory encephalopathy
  - Assessing the extent of collateral circulation in individuals with known regions of severe stenosis or occlusion
  - To detect residual right to left shunting after repair/closure of an intracardiac or intrapulmonary shunt
  - Evaluation of AVM both pre- and post-surgical intervention.
  - Periprocedural monitoring to detect cerebral thrombosis, embolization, hypoperfusion, and hyperperfusion
  - Assessing the stroke risk in children aged two to sixteen with homozygous sickle cell disease
  - Annual screening for individuals with Sickle Cell Anemia (Hb-SS) and Sickle Beta Thalassemia (Sß) (CPT® 93886) up to the age of 16.
- TCD studies are considered not medically necessary for evaluation of:
  - Brain tumors
  - Familial and degenerative disease of the brain
  - Psychiatric disorders
  - Epilepsy
  - Migraine or other primary headache disorders
  - Infectious and inflammatory conditions

Background and Supporting Information

- Transcranial Doppler (TCD) ultrasound provides rapid, non-invasive, real-time measure of cerebrovascular function.

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- TCD can be used to measure flow velocity in the proximal cerebral arteries to assess relative changes in flow, diagnose focal vascular stenosis, or to detect embolic signals within these arteries.
- TCD can be used to measure blood flow responses to changes in blood pressure (cerebral autoregulation), changes in end-tidal CO2 (cerebral vasoreactivity), or cognitive and motor activation (neurovascular coupling or functional hyperemia).
- A technical limitation of TCD includes inadequate temporal bone acoustic windows due to a thickened skull which limits ultrasound penetration.
- Studies are ongoing regarding the use of TCD in the evaluation of dementia and psychiatric conditions such as depression.
- CPT® 93892 and CPT® 93893 represent add on services that require additional expertise, lab time, and equipment not included in the complete and limited codes. These additional codes may be appropriate during the same encounter if medical necessity is documented.
- CPT® 93892/CPT® 93893: Identification of right to left shunts (microembolic signals may be detected during TCD monitoring) and may indicate source of emboli in individuals with stroke or TIA. TCD bubble test is very sensitive and may be superior to transthoracic and transesophageal echocardiography in detection of right to left shunts.
- Transcranial Doppler (TCD) is considered not medically necessary for the following indications:
  - Assessing individuals with migraine;
  - Monitoring during cardiopulmonary bypass and other cerebrovascular and cardiovascular interventions, and surgical procedures (except during carotid endarterectomy, as noted above);
  - Evaluation of individuals with dilated vasculopathies such as fusiform aneurysms;
  - Assessing autoregulation, physiologic, and pharmacological responses of cerebral arteries; and/or
  - Evaluating children with various vasculopathies, such as moyamoya disease and neurofibromatosis.

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Evidence Discussion (HD-24)

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- Functional magnetic resonance imaging (fMRI) is useful for localizing eloquent cortex in relation to a focal brain lesion, for pre-surgical planning and therapeutic follow up (ACR, 2022). Overall functional MRI imaging sensitivity is 83% with a specificity of 82%, for mapping language and motor functions (Bizzi et al., 2008). Functional MRI is a useful tool for predicting post-operative outcomes in individuals with a single brain tumor (Kundu et al., 2013). Overall, fMRI studies are used in pre-operative decision making in 89% of tumor individuals and in 91% of epilepsy surgery individuals (Lee et al., 1999; Medina et al., 2005). In 63% of epilepsy individuals undergoing surgical evaluation, fMRI imaging results helped to avoid further studies, including the Wada test (Medina et al., 2005).
- For cases when conventional imaging by magnetic resonance imaging or computed tomography provides limited information regarding specific clinical questions, magnetic resonance spectroscopy (MRS) provides further characterization of brain tumors, radiation treatment changes, cerebral abscess, seizure disorders, and inherited metabolic disorders (ACR 2024; Law, 2004; Weinberg et al., 2021). MRS has a 90% sensitivity and 86% specificity in distinguishing tumoral tissue from non-tumoral tissue (Law, 2004).
- Pulse-gated MRI imaging or MRI CINE is performed as part of an MRI Brain study and allows qualitative and quantitative analysis of oscillatory cerebrospinal fluid (CSF) movement in normal and abnormal conditions (Farb & Rovira, 2020; ACR, 2022). This imaging technique is useful for evaluation of hydrocephalus, Chiari syndromes, Normal Pressure Hydrocephalus, intracranial hypertension, and spontaneous intracranial hypotension (Bradley, 2016; Farb & Rovira, 2020).
- MRI perfusion is useful for the diagnosis and characterization of mass lesions, surgical planning and therapeutic follow-up (ACR, 2022; Petrella & Provenzale, 2000). MR perfusion allows localization of tumor for higher yield on stereotactic biopsy and non-invasive differentiation between radiation necrosis from recurrent tumor when conventional MR findings are equivocal (Petrella & Provenzale, 2000).
- CT perfusion has multiple uses including in stroke diagnosis and treatment planning, characterization of neoplastic disease and response to treatment, and is alternative modality for those with contraindication to MRI-based perfusion imaging (ACR 2022; Powers et al., 2019).
- The American Heart Association/American Stroke Association guidelines for acute stroke management recommended CT perfusion for selecting candidates for mechanical thrombectomy within 24 hours after last known well (Powers et al., 2019).

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Epistaxis (HD-25)

Guideline

Epistaxis (HD-25.1)
References (HD-25)

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Epistaxis (HD-25.1)

HD.EX.0025.1.A
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Criteria

- After initial nasal endoscopy by ENT, if there are findings suspicious for a mass lesion, the following imaging is considered medically necessary:
  - CT Maxillofacial without or with contrast (CPT® 70486 or CPT® 70487) **AND/OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543)
- Individuals who have failed initial management with cauterization and packing and have persistent or recurrent epistaxis despite these primary interventions, should be referred to a clinician who can evaluate the individual for their candidacy for surgical ligation or endovascular embolization.
- Prior to embolization with surgical or endovascular technique, CT Maxillofacial without contrast (CPT® 70486) **OR** CT Maxillofacial with contrast (CPT® 70487) is considered medically necessary when requested by the clinician performing embolization or referring for embolization.
  - If endovascular embolization is planned, the following studies are considered medically necessary ahead of the interventional radiologic procedure:
    - CTA Head (CPT® 70496) OR
    - CTA Neck (CPT® 70498)
      - CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session.

Background and Supporting Information

The American Academy of Otolaryngology Head and Neck Surgery recommended, in its most recent 2020 Clinical Practice Guidelines on Epistaxis, that the clinician should perform, or should refer to a clinician who can perform, nasal endoscopy to identify the site of bleeding and guide further management in individuals with recurrent nasal bleeding, despite prior treatment with packing or cautery, or with recurrent unilateral nasal bleeding. No recommendations for advanced imaging are outlined in this guideline without the exam findings (anterior rhinoscopy and/or nasal endoscopy) or the procedural needs of the individual indicating the need for such studies. If anterior rhinoscopy does not reveal the source of bleeding, it is recommended that the clinician perform nasal endoscopy or refer to a clinician who can perform nasal endoscopy, first.

Embolization procedures have shown an average nosebleed control rate of 87%, with minor transient complications in 20% (transient nasal ischemia, temporal-facial pain or numbness, headache, swelling, jaw claudication, trismus, and access site complications

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not requiring additional therapy) and major complications in up to 2.1% to 3.8% (skin/nasal necrosis, permanent facial nerve paralysis, monocular blindness, and stroke).

Detailed angiography, including internal and external carotid angiography, and precise embolization techniques are required. Despite use of meticulous techniques and knowledge of external carotid-internal carotid anastomoses, blindness and stroke are the most feared complications of endovascular embolization. These complications are rare but are more frequent than in individuals undergoing surgical arterial ligation. In one study, similar transient ischemic attacks are demonstrated across all groups but there is increased risk of stroke in the groups who underwent endovascular embolization alone (0.9%) or combined with surgical ligation (1.6%) as compared with surgical ligation alone (0.1%).

Evidence Discussion (HD-25)

- The American Academy of Otolaryngology - Head & Neck Surgery (AAO-HNS) recommendeds, in its most recent 2020 Clinical Practice Guidelines on Epistaxis, that the clinician should perform, or should refer to a clinician who can perform, nasal endoscopy to identify the site of bleeding and to guide further management in individuals with recurrent nasal bleeding despite prior treatment with packing or cautery, or with recurrent unilateral nasal bleeding. No recommendations for advanced imaging are outlined in this AAO-HNS Guideline without the exam findings (anterior rhinoscopy and/or nasal endoscopy) or the procedural needs of the individual, directing the need for such studies. If anterior rhinoscopy does not reveal the source of bleeding, it is recommended that the clinician perform nasal endoscopy or refer to a clinician who can perform nasal endoscopy (Tunkel et al., 2020).
- Further characterization of any mass lesions suspected on initial nasal endoscopy may be evaluated with CT Maxillofacial, either with OR without contrast (CPT® 70487 or CPT® 70486), AND/OR MRI Orbit, Face, and/or Neck without and with contrast (CPT® 70543) (Expert Panel on Neurologic Imaging et al., 2017; ACR, 2021).
- Because of the risks involved in embolization procedures (blindness, stroke, and others), CT or MRI imaging is supported prior to any planned intervention (Strach et al., 2011).
- Embolization procedures have shown an average nosebleed control rate of 87%, with minor transient complications in 20% (transient nasal ischemia, temporal-facial pain or numbness, headache, swelling, jaw claudication, trismus, and access site complications not requiring additional therapy) and major complications in up to 2.1% to 3.8% (skin/nasal necrosis, permanent facial nerve paralysis, monocular blindness, and stroke) (Strach et al., 2011; Brinjiji et al., 2013).

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Mastoid Disease or Ear Pain (HD-26)

Guideline

Mastoid Disease or Ear Pain (HD-26.1)
References (HD-26)

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Mastoid Disease or Ear Pain (HD-26.1)

HD.MA.026.1.A
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Criteria

A pertinent clinical evaluation including a detailed history, physical examination (including otoscopic examination), must be performed on any individual with ear pain prior to considering advanced imaging. Common causes of ear pain include external and middle ear infections, dental problems, sinus infection, neck problems, tonsillitis, and pharyngitis.

Indications (Any one of the following)	Medically Necessary Imaging
• Persistent ear pain without obvious cause • Clinical suspicion for complicated or invasive infection such as mastoiditis • Clinical suspicion for complications from otitis media • Clinical suspicion of mass lesion causing ear pain • Significant trauma with concern for hematoma formation • Pre-operative planning • (For additional imaging requirements for cholesteatoma surgery, see bullet below) • (For skull base osteomyelitis, see **Skull Base Osteomyelitis (SBO) (HD-20.2)**)	• CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR** • CT Orbits/Temporal Bone without and with contrast (CPT® 70482) **OR** • MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) **OR** • MRI Orbits/Face/Neck without and with contrast (CPT® 70543)

- Advanced imaging is considered not medically necessary in the overwhelming majority of individuals with ear pain.
- The following imaging is considered medically necessary for **pre-operative evaluation** for cholesteatoma surgery when ordered by an otolaryngologist or in consultation with the otolaryngologist:
  - CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR**
  - CT Orbits/Temporal Bone without and with contrast (CPT® 70482)

  AND/OR

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  - MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) **OR**
  - MRI Internal Auditory Canal: (IAC) MRI can be reported as a limited study with one code from the set (CPT® 70540, CPT® 70542, or CPT® 70543), but should not be used in conjunction with MRI Brain codes (CPT® 70551, CPT® 70552, or CPT® 70553) if IAC views are performed as part of the brain.
- The following imaging is considered medically necessary one time **post-operatively** to exclude residual or regrown cholesteatoma to avoid the need for a second-look surgery when ordered by an otolaryngologist or in consultation with the otolaryngologist:
  - CT Orbits/Temporal Bone without contrast (CPT® 70480) **AND/OR**
  - MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553), **OR**
  - MRI Internal Auditory Canal: (IAC) MRI can be reported as a limited study with one code from the set (CPT® 70540, CPT® 70542, or CPT® 70543), but should not be used in conjunction with MRI Brain codes (CPT® 70551, CPT® 70552, or CPT® 70553 if IAC views are performed as part of the brain
- Eustachian Tube Dilation: (endoscopic balloon dilatation of the Eustachian Tube, to treat persistent Eustachian tube dysfunction)
  - CT Orbit/Temporal Bone without contrast (CPT® 70480) is considered medically necessary for pre-operative evaluation of possible aberrant carotid.
- Concern for petrous apex lesions when requested by the otolaryngologist or in consultation with the otolaryngologist, the following are considered medically necessary:
  - CT Orbit/Temporal bone without contrast (CPT® 70480) **OR**
  - CT Orbit/Temporal bone without and with contrast (CPT® 70482) **AND/OR**
  - MRI Brain without and with contrast (CPT® 70553) **OR**
  - MRI Internal Auditory Canal: (IAC) MRI can be reported as a limited study with one code from the set (CPT® 70540, CPT® 70542, or CPT® 70543), but should not be used in conjunction with MRI Brain codes (CPT® 70551, CPT® 70552, or CPT® 70553 if IAC views are performed as part of the brain
- For concern related to non-resolving otalgia with chronic otorrhea:
  - See **Skull Base Osteomyelitis (SBO) (HD-20.2)**

Background and Supporting Information

- Common causes of ear pain include external and middle ear infections, dental problems, sinus infection, neck problems, and referred pain from the oral pharynx.

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- Clinical suspicion for complications from otitis media such as coalescent mastoiditis, resulting in: subperiosteal abscess formation/Bezold's abscess, acute facial nerve paralysis, and intracranial abscess formation.
- Cholesteatomas are expansive cysts of the middle ear filled with cellular debris. They can be congenital or arise from recurrent middle ear infections or trauma to the tympanic membrane. Hearing loss is usually conductive, although if the lesion is large enough combined conductive and sensorineural hearing loss may be present. Otoscopic exam findings and symptoms may include a white mass in the middle ear cleft, painless drainage from the ear or chronic/recurrent ear infections.
- Petrous apex lesions/infections may include: cholesteatoma, cephalocele, mucocele, and cholesterol granuloma and can present with symptoms of pain, hearing loss, headache, vertigo, and Cranial nerve insults (including CN V VI, VII, IX, X, XI).

Evidence Discussion (HD-26)

- Contrast enhanced CT is commonly used for evaluation of head and neck infections due to its accessibility and short examination time. MRI provides better sensitivity of soft tissue infections in the setting of cholesteatoma, when there is concern for abscess formation or intracranial complications (Baba et al., 2023).

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Hearing Loss and Tinnitus (HD-27)

Guideline

Hearing Loss (HD-27.1)
Tinnitus (HD-27.2)
References (HD-27)

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Hearing Loss (HD-27.1)

HD.HL.0027.1.A
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Criteria

- An initial evaluation including hearing tests, by bedside testing or by formal audiology, is necessary to determine whether an individual's hearing loss is conductive (external or middle ear structures) or sensorineural (inner ear structures, such as cochlea or auditory nerve) hearing loss. See **General Guidelines (HD-1.0)**
- CT Orbits/Temporal Bone without (CPT® 70480) **OR** MRI Brain without and with contrast (with IAC views) (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for the following:
  - Mixed conductive (MC)/Sensorineural (SN) hearing loss or any sensorineural hearing loss (MRI generally preferred for SN - See *Background and Supporting Information*)
  - Unilateral fluctuating or asymmetric hearing loss
  - Cholesteatoma (see **Mastoid Disease or Ear Pain (HD-26.1)**)
  - Congenital hearing loss
  - Surgical planning, including cochlear implants (both CT Temporal Bone and MRI Brain for surgical planning if requested by surgeon or any provider in consultation with the surgeon)
  - Hearing loss with vertigo (see **Dizziness/Vertigo (HD-23.1)**)
- CT Orbits/Temporal Bone without contrast (CPT® 70480) is considered medically necessary for the following:
  - Conductive hearing loss should have a CT Temporal Bone initially in the absence of an evident mass in the middle ear
- CT Orbits/Temporal Bone with contrast (CPT® 70481) is considered medically necessary for the following:
  - Glomus tumors or other vascular tumors of the middle ear, and/or surgical planning
  - Acquired sensorineural hearing loss if MRI unavailable or contraindicated
- Limited MRI of the internal auditory canals (CPT® 70540, CPT® 70542, or CPT® 70543) is considered medically necessary when requested by the provider in place of a complete MRI Brain. Note: Limited MRI codes should not be used in addition to MRI Brain codes; IAC views are performed as additional sequences as part of the brain study (see **General Guidelines – Anatomic Issues (HD-1.1)**)
- FIESTA protocol can be performed with MRI Brain without contrast (CPT® 70551) or limited MRI with attention to internal auditory canals.

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Background and Supporting Information

- Sensorineural (SN) hearing loss – MRI is generally preferable to CT. CT Temporal bone is considered medically necessary in post-traumatic SN hearing loss, to evaluate for bony remodeling of the IAC due to vestibular schwannoma and labyrinthine ossification resulting from prior infection and for consideration of otospongiosis, a common cause of MC and SN hearing loss.

Evidence Discussion (HD-27.1)

- A complete history and otologic exam should be performed prior to advanced imaging for the workup of hearing loss. Formal audiometric testing is also necessary to determine whether the hearing loss is conductive, sensorineural, or mixed (Chandrasekar et al., 2019; Tunkel et al., 2014).
- MRI brain is generally preferred for sensorineural and mixed hearing loss, particularly for unilateral hearing loss, congenital loss, or for surgical planning (Sharma et al. 2018, ACR 2021, Jain et al.2023)
- CT orbits/temporal bone is preferred for cases of conductive hearing loss, trauma, or suspected bony or middle ear disorders (Sharma et al. 2018, ACR 2021, Jain et al.2023).
- Both may be supported for surgical planning (cochlear implants, petrous apex disorders). (Sharma et al. 2018, ACR 2021, Jain et al.2023).
- 3D-Fast imaging employing steady state acquisition (3D-FIESTA) demonstrates significantly higher spatial resolution with superior imaging contrast between cranial nerves and CSF with a shorter acquisition time than conventional MRI scan (Zou & Hirvonen, 2017).

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Tinnitus (HD-27.2)

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Criteria

- A hearing evaluation is not required prior to imaging for tinnitus.
- The history in individuals with tinnitus should include a description of the tinnitus (episodic or constant, pulsatile or non-pulsatile, rhythmicity, pitch, quality of the sound), as well as inciting or alleviating factors. Continuous and pulsatile tinnitus are more concerning for an underlying and significant disorder. Audiometric assessment can be used as initial diagnostic testing particularly in individuals with tinnitus that is unilateral, persistent (>6 months) or associated with hearing difficulties (see **General Guidelines (HD-1.0)**)

Indications (Any one of the following)	Medically Necessary Imaging
• Clinical suspicion of mass lesion causing tinnitus • Asymmetric or unilateral non-pulsatile tinnitus (i.e., tinnitus that localizes to one ear) • Tinnitus associated with focal neurologic abnormalities, including asymmetric hearing loss • Persistent tinnitus after recent significant trauma. • Pulsatile tinnitus with or without concern for vascular lesion	• CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR** • CT Orbits/Temporal Bone without and with contrast (CPT® 70482) **OR** • MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) **OR** • MRI Brain without contrast with attention to internal auditory canals (CPT® 70551) **OR** • MRI Orbits/Face/Neck without contrast (CPT® 70540), with contrast CPT® 70542, or without and with contrast (CPT® 70543)
• Pulsatile tinnitus • Suspicion for vascular lesions	• MRA Head (CPT® 70544, CPT® 70545 OR CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548 or CPT® 70549) **OR** • CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session,

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- Imaging is considered not medically necessary for bilateral non-pulsatile tinnitus without other neurologic signs or symptoms
- Limited MRI of the internal auditory canals (CPT® 70540, CPT® 70542, or CPT® 70543) is considered medically necessary when requested by the provider in place of a complete MRI Brain. Note: Limited MRI codes should not be used in addition to MRI Brain codes; IAC views are performed as additional sequences as part of the brain study (see **General Guidelines – Anatomic Issues (HD-1.1)**)
- CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures.

Background and Supporting Information

- Non-pulsatile tinnitus may be described as ringing, buzzing, or clicking sensations which is constant and non-synchronous.
- Pulsatile tinnitus is a repetitive sound coinciding with the individual's heartbeat. The symptom may be subjective or objective.

Evidence Discussion (HD-27.2)

- A targeted history and clinical examination should be performed as the initial evaluation of an individual with tinnitus and determination as to whether the tinnitus is bothersome or not should be made before any imaging is considered (Chandrasekhar et al., 2019; Tunkel et al., 2014).
- Both MRI and CT have utility in diagnosing the etiology of tinnitus, particularly for concerns of mass lesions, or for tinnitus in conjunction with hearing loss or trauma (Expert Panel on Neurologic Imaging et al., 2018; ACR, 2021; Expert Panel on Neurologic Imaging et al., 2023).
- MRA or CTA of the head and neck are also useful in the workup of pulsatile tinnitus or for suspicion of a vascular lesion(Expert Panel on Neurologic Imaging et al., 2018; ACR, 2021; Expert Panel on Neurologic Imaging et al., 2023).

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Neurosurgical Imaging (HD-28)

Guideline

Neurosurgical Imaging (HD-28.1)
Neuronavigation (HD-28.2)
Post-Operative Imaging (HD-28.3)
Evidence Discussion (HD-28)
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Neurosurgical Imaging (HD-28.1)

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Criteria

- Typically, advanced imaging for monitoring disease for mass lesions occurs after biopsy (histologic) confirmation. This ensures appropriate determination related to phase of oncology imaging and alignment to appropriate diagnosis-specified guideline section.
  - However, repeat imaging by neurosurgeons or others of the management team for areas of the central nervous system (CNS) where permanent neurologic damage would be excessive with even a limited biopsy attempt is considered medically necessary.
  - Examples would include, but are not exclusive to: medically fragile individual, and tumors of the brainstem, eloquent areas of the brain, deep gray matter areas of the brain (ex. thalamus), and cavernous sinus.
- Repeat diagnostic head imaging is considered medically necessary when:
  - previous diagnostic head imaging is determined to be inadequate or additional imaging sequences/protocols are required by the neurosurgeon or the treatment team
  - prior imaging is greater than 6 months old

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Neuronavigation (HD-28.2)

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Criteria

- Neurosurgical navigation is “image-based” meaning that the necessary pre-operative CT and MRI images are used for navigation in the operating room (image acquisition). Accurate registration (a process to match the pre-operative images to the individual position) of pre-operative images is necessary to guide surgery regardless of the navigation system that is used. Registration can be point-based or surface matched routines to allow the surgeon to view the overlapping data sets and the current situation to allow navigation.
- The process of registration for neuronavigation via the acquisition of pre-operative CT and MRI images does not require a radiologist interpretation.
  - Diagnostic imaging codes are considered not medically necessary for the purpose of registration for neuronavigation.
  - Can be referenced by proprietary brand systems such as Brainlab or Stealth imaging procedures
  - See **Unlisted Procedures/Therapy Treatment Planning (Preface-4.3)** in the Preface Imaging Guidelines and **Unlisted Procedure Codes (ONC-1.5)** in Oncology in the Oncology Imaging Guidelines
- Advanced imaging for neuronavigation (image acquisition for registration for surgery) is considered medically necessary with one of each of the following as unlisted codes apply:
  - Unlisted MRI procedure code (CPT® 76498)
  - Unlisted CT procedure code (CPT® 76497)
  - Due to variances with techniques currently available for neuronavigation, the following are considered medically necessary:
    - CTA or MRA Head and Neck vessels for surgical planning and neuronavigation, see **General Guidelines – CT and MR Angiography (HD 1.5)**.
    - 3D (CPT® 76377 or CPT® 76376) (see **General Guidelines – Other Imaging Situations (HD-1.7)**)
  - Diagnostic imaging codes are only considered medically necessary if radiological supervision and interpretation of imaging is necessary with supporting documentation
    - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain with contrast (CPT® 70552) **OR** MRI Brain without and with contrast (CPT® 70553) (contrast as requested) **AND/OR** CT Head without contrast (CPT® 70450) **OR** CT Head with

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contrast (CPT® 70460) **OR** CT Head without and with contrast (CPT® 70470) (contrast as requested)

- AI-powered connectomic analysis of the brain may be ordered as CPT® 1039T.
  - These studies lack sufficient specificity and sensitivity to be clinically useful. Their use is limited to research studies and are considered experimental and investigational.

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Post-Operative Imaging (HD-28.3)

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Criteria

- Post-operative imaging including MRI Brain without contrast (CPT® 70551), or MRI Brain with contrast (CPT® 70552), or MRI Brain without and with contrast (CPT® 70553) (contrast as requested) or CT Head without contrast (CPT® 70450), or CT Head with contrast (CPT® 70460), or CT Head without and with contrast (CPT® 70470) (contrast as request) is considered medically necessary per neurosurgeon's or in concert with management team's request that includes, but not exclusive to the following indications:
  - Within 24-72 hours following brain surgery including to document the need for repeat surgery or if adjuvant intervention is necessary, concern or rule out for complication(s), evaluation if incomplete resection vs. consideration for plan for gross resection
  - Signs or symptoms indicating concern of clinical deterioration
  - Development of new neurological signs or symptoms
  - Follow-up on blood products, edema, and/or concern of cerebrospinal fluid leak
  - Follow- up imaging per condition-based guideline
- See additional condition-based guidelines:
  - Pediatric Neurosurgeries
    - See **Special Imaging Studies in Evaluation for Epilepsy Surgery (PEDHD-6.3)** in the Pediatric Head Imaging Guidelines
    - See **Modality General Considerations (PEDONC-1.3)** and **Pediatric CNS Tumors (PEDONC-4)** in the Pediatric and Special Populations Oncology Guidelines
  - Epilepsy
    - See **Perioperative Evaluations for Drug-Resistant Epilepsy (HD-9.2)**
  - Movement Disorders
    - See **Movement Disorders (HD-15.1)**
  - Pituitary or Sella Surgery
    - See **Pituitary (HD-19.1)**
  - Acoustic Neuroma and Other Cerebellopontine Angle Tumors
    - See **Acoustic Neuroma and Other Cerebellopontine Angle Tumors (HD-33.1)**
  - Central Nervous System Tumors

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- See **Primary Central Nervous System Tumors (ONC-2)** and **Brain Metastases (ONC-31.3)** in the Oncology Imaging Guidelines

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Evidence Discussion (HD-28)

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- Imaging modalities for neurosurgical planning include MRI Brain and CT Head, along with vascular imaging.
- MRI Brain is the preferred modality for the evaluation of intracranial neoplasms and other conditions affecting the brain parenchyma, meninges or cranium, due to its superior soft tissue resolution when compared to CT Head (ACR, 2024).
- CT Head is the preferred modality for evaluation of bony structures in the pre-operative setting (ACR, 2020c).
- For localization of relevant vascular anatomy prior to surgery, MRI Angiography (MRA) head and neck or CT Angiography (CTA) head and neck, may be appropriate (ACR 2024, ACR 2020b).
- Pre-surgical navigational imaging, whether by CT or MRI, allows a spatially accurate anatomical individual model for use in the treatment-planning process (Orringer et al., 2012; ACR, 2021b).
- The requirements for surgical planning images differ from the requirements for diagnostic images, especially regarding the spatial accuracy of the images in the stereotactic coordinates used for localization and targeting (Orringer et al., 2012; ACR, 2021b).
- Navigation based on an immediate pre-operative scan optimizes the accuracy of data used for initial surgical planning (Orringer et al., 2021). Navigation systems reduce length of surgery, lower incidence of wound infection and shorten length of post-operative hospital stay (Khoshnevisan & Allahabadi, 2012).
- For post-operative imaging, CT Head is also useful for follow-up of intracranial hemorrhage, edema, hydrocephalus, shunts, and general post-operative follow-up. CT Head has the benefit of providing rapid evaluation if a post-operative complication is suspected (ACR, 2024). Post-operative MRI Brain provides superior soft tissue resolution in less urgent scenarios (ACR, 2020c).

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Sinus and Facial Imaging (HD-29)

Guideline

Sinus and Facial Imaging (HD-29.1)
Evidence Discussion (HD-29.1)
References (HD-29)

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Sinus and Facial Imaging (HD-29.1)

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Criteria

- CT Maxillofacial without contrast (CPT® 70486) or limited CT Sinus without contrast (CPT® 76380) is considered medically necessary for ANY of the following:
  - Acute sinusitis without resolution of symptoms after a minimum of 4 weeks of treatment (treatment can include an appropriate course and duration of empiric oral antibiotic, topical intranasal steroid, and/or nasal saline rinses.)
  - Concern for potential or suspected complicated sinusitis, which is sinusitis with actual or threatened orbital or intracranial extension
  - Recurrent sinusitis (4 or more episodes of acute bacterial rhinosinusitis within the past 12 months without symptoms or signs between episodes)
    - In practice, recurrent acute exacerbations of chronic rhinosinusitis are seen as well as recurrent acute rhinosinusitis with disease free intervals between the acute episodes. CT Maxillofacial without contrast (CPT® 70486) may still be considered medically necessary under chronic sinusitis definitions.
  - Suspicion of chronic sinusitis (**Note:** A trial of antibiotic therapy is not required prior to imaging if individual meets criteria for chronic sinusitis)
    - Chronic sinusitis is suspected when **BOTH** of the following are met:
      - At least two of the following on history and physical exam:
        - Mucopurulent drainage
        - Nasal obstruction or congestion
        - Facial pain, pressure, and/or fullness (may involve the anterior face, periorbital region, or manifest with headache that is localized or diffuse)
        - Decreased sense of smell (see **Taste and Smell Disorders (HD-2.1)** if anosmia, hyposmia, or dysosmia is an isolated symptom)

        AND
      - The aforementioned findings on history and physical exam have been present for at least 12 weeks
  - Sinus surgery is being considered (including Balloon Sinus Ostial Dilation or Functional Endoscopic Sinus Surgery)
  - Follow-up on incidentally noted sinus pathology (i.e., mucosal thickening, partial opacification of a sinus, or other indeterminate finding in incompletely visualized sinuses) on other imaging studies not performed for the purpose of evaluating sinus pathology, such as MRI Brain for headache, when requested by ENT for clinical correlation.

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- Studies requested for the sole purpose of navigation for sinus surgery should be coded CPT® 77011 (CT guidance for stereotactic localization).
  - It is not appropriate to report both CPT® 70486 and CPT® 77011 for the same CT stereotactic localization imaging session.
- For unexplained cough as the main symptom, and suspected Upper Airway Cough Syndrome (UACS) as the etiology, see **Cough (CH-3.1)** in the Chest Imaging Guidelines.
- For the immunocompromised individual with symptoms of sinusitis, the following are considered medically necessary:
  - CT Maxillofacial (contrast level as requested) when ordered by the surgeon or in consultation with the surgeon (i.e., ENT or ophthalmologist)
  - CT Maxillofacial with contrast (CPT® 70487) when there is suspicion for ANY of the following:
    - Orbital or facial cellulitis
    - Proptosis
    - Abnormal visual examination
    - Ophthalmoplegia
    - Fungal or vascular lesions visualized in nasal cavity
- CT Maxillofacial without contrast (CPT® 70486) **OR** CT Maxillofacial with contrast (CPT® 70487) **OR** MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary for the conditions below. However, CT Maxillofacial without contrast (CPT® 70486) may also be requested with MRI Orbits/Face/Neck without and with contrast (CPT® 70543) for surgical planning or osseous involvement.
  - Sinonasal obstruction, polyp, or suspected mass
  - Suspected orbital complication
  - Suspected invasive fungal sinusitis
  - Cystic fibrosis
  - Osteomyelitis and odontogenic infections, see **Skull Base Osteomyelitis (SBO) (HD-20.2)** and **Dental/Periodontal/Maxillofacial Imaging (HD-30.2)** for additional imaging modalities
- CT Maxillofacial without contrast (CPT® 70486) **AND** MRI Orbits/Face/Neck without and with contrast (CPT® 70543) are considered medically necessary when ordered by the ENT/ specialist prior to planned biopsy of an intranasal mass — the extent and origin of which could not be determined by complete rhinologic exam alone
- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for suspected intracranial complication
- CT Orbits/Temporal bone without contrast (CPT® 70480) or CT Orbits/Temporal bone with contrast (CPT® 70481) is considered medically necessary performed alone or added to CT Maxillofacial for:
  - suspected orbital complications

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- For skull base osteomyelitis (SBO), see **Skull Base Osteomyelitis (SBO) (HD-20.2)**
- Repeat imaging is considered medically necessary for ANY of the following scenarios:
  - An ENT specialist or any provider in consultation with an ENT specialist requests the imaging **and** ONE or more of the following:
    - There has been a follow-up visit since the previous imaging and there is no improvement after an additional 3 weeks of conservative treatment after initial imaging was completed:
      - The following imaging is medically necessary: CT Maxillofacial without contrast (CPT® 70486) **OR** limited CT Sinus without contrast (CPT® 76380)
    - There is a new abnormality on exam such as obstructing mass
      - The following imaging is considered medically necessary: CT Maxillofacial without contrast (CPT® 70486) **OR** CT Maxillofacial with contrast (CPT® 70487)
    - If sinus surgery is planned (including but not limited to Balloon Sinus Ostial Dilation or Functional Endoscopic Sinus Surgery) **AND** the most recent diagnostic CT Maxillofacial without contrast (CPT® 70486) is greater than 6 months old **OR** there is a change in clinical status as described above (i.e. interval completion of provider-prescribed medical management after the last CT was performed), a repeat diagnostic CT Maxillofacial without contrast (CPT® 70486) is considered medically necessary for surgical planning.
      - Repeat CT Maxillofacial solely for the use of navigation during the sinus surgery (i.e., the most recent diagnostic CT Maxillofacial performed within the prior six months was only inadequate due to lacking anatomic landmarks or insufficient thinness of cuts) should be requested with CPT® 77011, not the diagnostic CPT® 70486.
      - 3D Rendering (CPT® 76376 or CPT® 76377) should not be reported in conjunction with CPT® 77011 (or CPT® 70486 if used). The procedure inherently generates a 3D dataset.
- Complications of ABRS (acute bacterial rhinosinusitis) are suspected based on:
  - Any constellation of symptoms worrisome for intracranial extension of infection or meningitis (i.e., severe headache, photophobia, fever, neck stiffness)
  - Severe headache
  - Facial swelling
  - Cranial nerve palsies
  - Orbital signs (cellulitis, impaired extraocular motility, decrease in vision or proptosis)
- Complications of ABRS are best assessed using iodine contrast-enhanced CT Maxillofacial with contrast (CPT® 70487) **OR** gadolinium-based MR imaging (MRI

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Orbits/Face/Neck without and with contrast (CPT® 70543) to identify extra-sinus extension or involvement; thus, this imaging is medically necessary.

- CT Maxillofacial without contrast (CPT® 70486) may also be requested with MRI Orbits/Face/Neck without and with contrast (CPT® 70543) for surgical planning or osseous involvement.
- Suspected complications is the only medically necessary indication for MR imaging of the paranasal sinuses in the setting of ABRS.

For additional medical necessity criteria for CT Maxillofacial, see **Cone Beam Computed Tomography (CBCT) (HD-24.7)** and **Dental/Peridontal/Maxillofacial Imaging (HD-30.2)**)

Evaluation of potential candidates for Eustachian Tube balloon dilation procedure is with a one-time CT of the temporal bone without contrast (CPT® 70480). See medical necessity discussion in **Mastoid Disease or Ear Pain (HD-26.1)**. CT Sinus/Maxillofacial irrespective of contrast level is considered note medically necessary if the sole indication for medical necessity is to evaluate a potential candidate for Eustachian Tube balloon dilation procedure, without meeting other HD-29.1 medical necessity criteria.

Background and Supporting Information

- Rhinosinusitis is defined as inflammation of the nasal cavity and adjacent paranasal sinuses. Acute sinusitis refers to symptom duration less than 4 weeks, subacute 4 to 12 weeks, and chronic greater than 12 weeks. Complicated sinusitis refers to symptoms suggesting spread of disease into adjacent structures, including orbital or intracranial complications.
- There is no evidence to support advanced imaging of acute (less than 4 weeks) and subacute (4 to 12 weeks) uncomplicated rhinosinusitis.
- There is no evidence to support routine follow-up advanced imaging after treatment with clinical improvement of sinusitis.

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Evidence Discussion (HD-29.1)

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- The American Academy of Otolaryngology – Head & Neck Surgery (AAO-HNS) recommended that clinicians should not obtain radiographic imaging for individuals with suspected uncomplicated Acute Rhinosinusitis (ARS), with imaging reserved for cases with clinically suspected complication. ARS refers to inflammation of the nasal cavity and paranasal sinuses lasting less than 4 weeks' duration (Rosenfeld et al., 2015).
- Contrasted CT Maxillofacial is first line imaging for rhinosinusitis with suspected complications (orbital or intracranial). There is up to 91% accuracy with CT to detect orbital complications vs clinical exam alone. CT also is preferred for surgical planning. However, CT is often more useful for surgical planning and easier to perform. Non-contrasted CT Sinus is not preferred but may be useful for surgical navigation. There is no relevant literature to support pre- and post-contrast CT imaging. MRI Head or orbits/face/neck can be complementary with CT. MRI is more accurate than CT in the evaluation of soft tissues regarding intra-orbital and intracranial complications (Expert Panel on Neurological Imaging et al., 2022, ACR 2021).
- Chronic rhinosinusitis, acute recurrent bacterial sinusitis, non-invasive fungal sinusitis, and/or sinonasal polyposis are best evaluated initially with non-contrast CT Maxillofacial. CT is critical for surgical planning. Contrast is not necessary unless complications are suspected. MRI is not useful as the first-line study because of the lack of bony detail. In select cases, evaluation with MRI without and with IV contrast may be helpful to differentiate fluid secretions from inflamed mucosa and exclude an underlying obstructing mass (Expert Panel on Neurological Imaging et al., 2022; ACR 2021).
- Urgent CT Maxillofacial, either without or with IV contrast is first line imaging for any suspected invasive fungal sinusitis, as delay in diagnosis and surgical debridement could increase the already high risk of mortality. In cases of invasive fungal sinusitis, MRI without and with IV contrast of the head and/or orbits/face/neck is adjunctive to look for invasion into surrounding soft tissues as well as vascular complications (Expert Panel on Neurological Imaging et al., 2022; ACR, 2021).
- CT and MRI are considered complimentary imaging modalities in the evaluation of a sinonasal mass—localizing and characterizing the lesions to determine their extent for treatment planning. If an MRI is planned, the CT may be performed without IV contrast since the main purpose of the CT is to evaluate osseous involvement (Expert Panel on Neurological Imaging et al., 2022; ACR 2021).

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Temporomandibular Joint Disease (TMJ) and Dental/ Periodontal/Maxillofacial Imaging (HD-30)

Guideline

Temporomandibular Joint Disease (TMJ) (HD-30.1)
Dental/Periodontal/Maxillofacial Imaging (HD-30.2)
References (HD-30)

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Temporomandibular Joint Disease (TMJ) (HD-30.1)

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Criteria

- MRI TMJ (CPT® 70336) is the diagnostic study of choice and is considered medically necessary for those who fail a minimum of 6 weeks of non-surgical treatment **AND** who are actively being considered for TMJ surgery.
  - The exception to the conservative management and surgical consideration requirement above includes the need to evaluate a recent trauma, dislocation, severe malocclusion, dental infection, or abscess.
- CT Maxillofacial without contrast (CPT® 70486) or without and with contrast (CPT® 70488) when there is suspicion of bony involvement based on prior x-ray or MRI
- Ultrasound (CPT® 76536) is considered medically necessary to look for the presence of a joint effusion and to evaluate cartilage and disk displacement with open and closed mouth imaging and to guide injections
- For TMJ imaging in individuals with Juvenile Idiopathic Arthritis (see **Temporomandibular Joint (TMJ) Imaging in Children (PEDHD-25)** in the Pediatric Head Imaging Guidelines)
  - MRI TMJ (CPT® 70336) is medically necessary annually for detecting silent TMJ arthritis in children and young adults with juvenile idiopathic arthritis as requested by a rheumatologist and/or oral/maxillofacial surgeon (OMS) and/or any provider in consultation with a rheumatologist or OMS.
  - Repeat imaging with MRI TMJ (CPT® 70336) in individuals with JIA is considered medically necessary for any of the following:
    - Change in signs or symptoms suggesting progression of disease
    - To monitor the effects of treatment[11]
  - Bone Scintigraphy/Bone Scan 3 Phase Study (CPT® 78315) in individuals over 12 years of age is considered medically necessary in anticipation or consideration of surgery.
- Jaw Asymmetry - Unilateral condylar hyperplasia is manifested by slow growth in areas of the mandible causing facial asymmetry. It is usually a self-limiting condition seen predominantly in individuals 12 to 30 years of age.
  - CPT® 78315 Bone Scan 3 Phase Study is considered medically necessary in anticipation or consideration of surgery.

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Evidence Discussion (HD-30.1)

- MRI is preferred for evaluation of the temporomandibular joint (TMJ) due to its superior contrast resolution and its ability to acquire dynamic imaging for demonstration of the functionality of the joint (Bag, 2014; Whyte et al., 2021).
- MRI is the imaging modality of choice for the diagnosis of internal derangement with an accuracy of 95% in assessing the disc position and form and 93% accuracy in assessing the osseous changes (Bag, 2014).
- MRI is reserved for individuals with persistent symptoms in whom conservative measures have been ineffective, or in those with suspected internal joint derangement (Scrivani et al., 2008; Gauer & Semidey, 2015; National Academies of Sciences, Engineering and Medicine, 2020). Imaging the TMJ prematurely may lead to harms including unnecessary surgery (Mercuri, 2012).
- CT is the alternative modality for evaluating bony anatomy of the TMJ, fractures, degenerative changes, erosions, infections, congenital anomalies, acute and chronic inflammatory conditions, pre-operative evaluation and follow- up after surgery (Bag, 2014; ACR, 2021; Whyte et al. 2021).
- For pre-operative planning of unilateral condylar hyperplasia, bone scintigraphy is useful to predict ongoing condylar growth (Liu & Shi, 2021).
- The diagnosis of chronic rheumatoid arthritis of the TMJ is established with contrast-enhanced MRI (Schmidt et al., 2022). It is the preferred imaging study for diagnosis, disease progression, treatment monitoring and annual surveillance of TMJ arthritis in juvenile idiopathic arthritis (JIA) (Schmidt et al., 2022).

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Dental/Periodontal/Maxillofacial Imaging (HD-30.2)

HD.TJ.0030.2.A
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Criteria

- Initial imaging with plain x-rays/dental x-rays is required.
- Cone beam CT is required for surgical planning and is, therefore, considered medically necessary for the potential indications listed below.
- Potential indications include but are not limited to:
  - Osteomyelitis and odontogenic infections (x-ray **NOT** required)
  - Bisphosphonate-related osteonecrosis of the jaw (x-ray **NOT** required)
  - Impacted teeth
  - Supernumerary teeth
  - Dentoalveolar trauma
  - Root resorption
  - Foreign body
  - Odontogenic cysts, tumors, or other jaw pathology
  - Orthognathic surgery for dentofacial anomalies
  - Maxillofacial bone graft planning
  - Dental implants related to tooth loss from injury, trauma, or jaw pathology such as cysts, tumors, or cancer
  - Post-operative imaging, including dental implants
- Cone Beam CT: Report with CPT® Codes: CPT® 70486, CPT® 70487, CPT® 70488, CPT® 70480, CPT® 70482 (see **Cone Beam Computed Tomography (CBCT) (HD-24.7)**)
- 3D rendering (CPT® 76376 or CPT® 76377) should **NOT** be reported separately
- Cone beam CT (CBCT) may also be called i-CAT scanner or mini-CAT scanner
- For cleft palate indications (see **Other Indications for Sinus Imaging (PEDHD-5.6)**)
- For salivary gland indications (see **Salivary Gland Disorders (Neck-11.1)**)

Background and Supporting Information

Dental x-rays include panoramic, periapical, and/or occlusal x-rays.

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Evidence Discussion (HD-30.2)

- CT is the radiologic modality for evaluating the bony anatomy of the head, acute and chronic inflammatory conditions, paranasal sinuses, pre-operative evaluation and follow-up after surgery (De Vos et al., 2009; ACR, 2021).
- Recommendations by the American Association of Endodontists and the American Academy of Oral and Maxillofacial Radiology supported the use of cone beam CT (CBCT) as a supplemental imaging technique when conventional radiography fails to answer the clinical question and for surgical planning (De Vos et al., 2009; Horner et al., 2015; Kim et al. 2019).

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Cranial Neuropathies (HD-31)

Guideline

Cranial Neuropathies (HD-31.1)
References (HD-31)

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Cranial Neuropathies (HD-31.1)

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Cranial Neuropathies Imaging Indications

Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for all individuals with new or worsening specific cranial nerve abnormalities.
- MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR** MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is also considered medically necessary for individuals with abnormalities in cranial nerves I, II, III, IV, V, VI, VII, IX, X, XI, or XII.
- CT Neck with contrast (CPT® 70491) is considered medically necessary for evaluation of abnormalities involving cranial nerves IX, X, XI, or XII.
- Imaging of the Brain and Orbit, Face and/or Neck is considered medically necessary concurrently when requested.
- For specific cranial neuropathies, see the corresponding guideline section listed below:
  - CN I: Olfactory nerve (see **Taste and Smell Disorders (HD-2.1)**)
  - CN II, III, IV, VI: Optic, Oculomotor, Trochlear and Abducens (see **Eye Disorders and Visual Loss (HD-32.1)**)
  - CN V: Trigeminal nerve (see **Trigeminal Neuralgia and other Centrally Mediated Facial Pain Syndromes (HD-10.1)**)
  - CN VII: Facial nerve (see **Facial Palsy (HD-6.1)**)
  - CN VIII: Vestibulocochlear nerve (see **Dizziness/Vertigo (HD-23.1)**, **Hearing Loss (HD-27.1)**, **Tinnitus (HD-27.2)**, **Acoustic Neuroma and Other Cerebellopontine Angle Tumors (HD-33.1)**. For isolated nystagmus (see **Eye Disorders and Visual Loss (HD-32.1)**)
  - CN IX: Glossopharyngeal nerve (see **Glossopharyngeal Neuralgia/ Glossopharyngeal Neuropathy HD-10.2)**)
  - CN X: Vagal nerve, imaging as detailed above (see also **Recurrent Laryngeal Palsy/Vocal Cord Palsy (Neck-7.1)**)
  - CN XI: Spinal accessory nerve, imaging as indicated above
  - CN XII: Hypoglossal nerve, imaging as indicated above
- For cranial neuropathies, whether isolated or multiple, due to clinically suspected stroke and/or vascular dissection (see **General Guidelines - CT and MR**

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Angiography (CTA/CTV and MRA/MRV) (HD-1.5), **Headache and Suspected Vascular Dissection (HD-11.1)** and **Stroke/TIA (HD-21.1)**

Background and Supporting Information

If a detailed clinical evaluation is unable to localize the site of the lesion, imaging of the entire course of the relevant cranial nerve is required, as cranial neuropathy can result from pathology affecting the nerve fibers at any point along the course of the nerve, from the cranial nerve origin in the brainstem to the end organ supplied by the nerve, requiring multiple imaging modalities.

The spinal trigeminal tract and nucleus extend from the midpons caudally into the upper cervical cord at the C2-4 levels. For suspected lesions of the spinal trigeminal tract and nucleus, imaging the brain stem and cervical spinal cord is supported. See **Trigeminal Neuralgia and other Centrally Mediated Facial Pain Syndromes (HD-10.1)**.

Number	Cranial Nerve Name	Nerve dysfunction on exam	Guideline Section in HD
I	Olfactory (smell)	Anosmia, hyposmia, parosmia, phatosmia	2
II	Optic (vision)	Optic neuritis, disc edema, papilledema, afferent pupillary defect APD)	16, 17, 32
III	Oculomotor (eye and pupil movement)	Eye "down and out", +/- dilated pupil, ptosis, diplopia	32
IV	Trochlear (depresses the eye)	Inability to depress the eye, diplopia	32
V	Trigeminal (sensation, mastication, taste)	Pain, numbness, corneal reflex loss, jaw deviation, trigeminal neuralgia, loss of taste	10
VI	Abducens (lateral movement of the eye)	Eye turns medially, inability to abduct, lateral rectus palsy, diplopia	32

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Number	Cranial Nerve Name	Nerve dysfunction on exam	Guideline Section in HD
VII	Facial (movement facial muscles, taste at 2/3, salivation/ lacrimation)	Inability to close eyelid, smile, nasolabial fold flattening, hyperacusis, impaired taste, salivation, lacrimation	6
VIII	Auditory, Vestibular, Vestibulochochlear (hearing and balance)	Hearing loss, tinnitus, vertigo, nystagmus, abnormal gait/ balance, sway on Romberg	23, 27, 33
IX	Glossopharyngeal (swallow, sensation, pharynx, posterior 1/3 tongue, parotid salivary gland)	Depressed gag reflex and palate, dysphagia, uvula deviation, throat pain	10, 2
X	Vagus (swallow, speech, parasympathetic to heart, lungs, GI tract)	Vocal cord paralysis, recurrent laryngeal nerve palsy, spasmodic dysphonia	7.1, 1.1
XI	Spinal Accessory (motor function neck/shoulder)	Sternocleidomastoid (SCM) weakness when turning head opposite, shoulder elevation, winging scapula	1.1
XII	Hypoglossal (tongue movement)	Tongue deviation, atrophy, fasciculation	1.1

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Number	Cranial Nerve Name	Nerve dysfunction on exam	Guideline Section in HD
INO	Internuclear Opthalmoplegia (lesion of medial longitudinal fasciculus, CN III, CN VI)	Impaired adduction of ipsilateral eye with nystagmus of abducting eye	16, 21, 22
Horner Syndrome	Disruption of sympathetic innervation to eye and face	Ptosis, miosis (constricted pupil), facial anhidrosis (absence of sweating)	32.2, 11.3

Evidence Discussion (HD-31.1)

- Imaging of each body section along the entire course of the relevant cranial nerve may be considered medically necessary if detailed clinical evaluation is unable to localize the site of the lesion. Cranial neuropathy can result from pathology affecting the nerve fibers at any point along the course of the nerve, from the cranial nerve origin in the brainstem to the end organ supplied by the nerve, indicating need to image multiple body sections (Expert Panel on Neurologic Imaging et al., 2018; Expert Panel on Neurologic Imaging, et al. 2022). MRI Brain, Orbits, Face, Neck, or any combination may be necessary depending on the clinical need (Expert Panel on Neurologic Imaging et al., 2018; Expert Panel on Neurologic Imaging, et al. 2022).
- MRI is the standard modality for imaging the cranial nerves (Expert Panel on Neurologic Imaging et al., 2022; ACR 2024).
- CT Neck is useful to exclude neck masses when evaluating either isolated or multiple lower cranial neuropathies (Expert Panel on Neuroloigcal Imaging et al., 2022). CT may be complementary to MRI in characterizing skull base erosions, calcifications, and skull base foramina (Expert Panel on Neurologic Imaging, et al. 2022).

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Eye Disorders and Visual Loss (HD-32)

Guideline

Eye Disorders and Visual Loss (HD-32.1)
Pupillary Abnormalities Including Horner Syndrome (HD-32.2)
References (HD-32)

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Eye Disorders and Visual Loss (HD-32.1)

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Criteria

- For specific conditions - See *Background and Supporting Information* that include table of abbreviations
- For eye pain, also refer to **Trigeminal Neuralgia/Trigeminal Neuropathy (HD-10.1)** and/or **Multiple Sclerosis and Related Conditions (HD-16)**
- Examination of ocular complaints and visual loss may include evaluation of pupillary responses, extraocular motility, visual acuity, visual field testing, intraocular pressures, external examination, slit lamp examination, and/or fundoscopic exam of retinae. An exam performed by a neuro-ophthalmologist, ophthalmologist, neurologist, or an optometrist meets this requirement.
- MRI Orbits/Face/Neck without contrast (CPT® 70540) **OR** MRI Orbits/Face/Neck without and with contrast (CPT® 70543) **OR** CT Orbits/Temporal bone with contrast (CPT® 70481) **OR** CT Orbits/Temporal bone without contrast (CPT® 70480) **AND/OR** MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for:
  - unexplained vision loss
  - optic atrophy (cranial nerve II)
  - optic neuropathy (cranial nerve II)
  - papilledema/optic disc swelling (cranial nerve II) (see **Cranial Neuropathies (HD-31.1)** and **Papilledema/Pseudotumor Cerebri (HD-17.1)**)
  - Afferent Pupillary Defect (APD) or Relative Afferent Pupillary Defect (RAPD)
  - chiasmal symptoms/signs (including bitemporal field deficit)
  - ophthalmoplegia, diplopia, and/or cranial nerve palsy (specifically CN III, IV, and VI, see **Cranial Neuropathies (HD-31.1)**)
  - nystagmus
- For acute vision loss with infection or inflammatory disorder suspected, CT Maxillofacial with contrast (CPT® 70487) is considered medically necessary, in addition to the imaging studies indicated for unexplained vision loss
- For optic disc edema/papilledema, CT Head without contrast (CPT® 70450) is considered medically necessary to assess for space-occupying processes such as intracranial hemorrhage, mass effect and hydrocephalus.
- For suspected optic neuritis, MRI is the preferred modality (see **Multiple Sclerosis (MS) (HD-16.1)** and **Neuromyelitis Optica Spectrum Disorders (HD-16.2)**)
- Visual field defects are associated with retrochiasmal pathology (see **Stroke/TIA (HD-21.1)** or **Primary Central Nervous System Tumors (ONC-2)** in the Oncology

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Imaging Guidelines or **Brain Metastasis (ONC- 31.3)** in the Oncology Imaging Guidelines)

- MRI Orbits/Face/Neck without contrast (CPT® 70540) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543) or CT Orbits/Temporal bone with contrast (CPT® 70481) is considered medically necessary for:
  - exophthalmos (including thyroid eye disease), enophthalmos or non-traumatic orbital asymmetry
  - suspected orbital cellulitis or atypical pre-septal cellulitis, uveitis, or scleritis
  - orbital mass or metastasis
  - orbital inflammatory syndrome (orbital pseudotumor) and dacryocystitis or dacryoadenitis
- CT Orbits/Temporal bone without contrast (CPT® 70480), OR CT Maxillofacial without contrast (CPT® 70486) and/or CT Head without contrast (CPT® 70450) is/are considered medically necessary for:
  - orbital trauma with visual defect see also **Facial Trauma (HD-13.2)**
  - exophthalmos (including thyroid eye disease)
- CT Orbits/Temporal bone without contrast (CPT® 70480) or CT Orbits/Temporal bone with contrast (CPT® 70481) or CT Orbits/Temporal bone without and with contrast (CPT® 70482) or CT Maxillofacial without contrast (CPT® 70486) or CT Maxillofacial with contrast (CPT® 70487) or CT Maxillofacial without and with contrast (CPT® 70488) is considered medically necessary for:
  - pre-operative planning for procedures including dacryocystorhinostomy (DCR) to correct nasolacrimal duct obstruction (NLDO)
- When requested by the surgeon or in consultation with surgeon, contrast level as requested is considered medically necessary. This includes requests from ophthalmologists and oculoplastic surgeons. Contrast level preference may vary per institutional protocol.
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) is medically necessary for suspicion of intracranial aneurysm, including third nerve palsy with pupillary involvement (see **Cerebral Aneurysms (HD-12.1)**
- MRA Head (CPT®70544, CPT®70545, or CPT®70546) or CTA Head (CPT®70496) **AND/OR** MRA Neck (CPT®70547, CPT®70548, or CPT®70549) or CTA Neck (CPT® 70498) is considered medically necessary for evaluation of diplopia due to suspected stroke or TIA (see **Cerebral Aneurysms (HD-12.1)**)
  - CTA Head and Neck (CPT® 70471) must be substituted for CTA Head (CPT®70496) and CTA Neck (CPT® 70498) if performed during the same session.
- Amaurosis Fugax (see **Stroke/TIA (HD-21.1)**)
  - Individuals describe a transient darkening or loss of vision, typically monocular
- Central Retinal Artery Occlusion, Branch Retinal Artery Occlusion, and Ophthalmic Artery Occlusion (see **Stroke/TIA (HD-21.1)**)

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- Individuals describe a sudden monocular loss of vision or visual field. Etiology is usually embolic and is considered a stroke to the retina
- There is currently no data to support advanced imaging while on Tepezza® (teprotumumab). However, advanced imaging is considered medically necessary for any of the following concerns:
  - Neurologic symptoms or ophthalmologic symptoms
  - To reassess compressive optic neuropathy (symptoms/signs of compressive optic neuropathy include APD, decreased visual acuity, and/ or visual field defects)
  - For non-response to Tepezza® (teprotumumab) or relapses, worsening proptosis, diplopia, lid retraction, or optic neuropathy
  - For surgical planning for orbital decompression, strabismus surgery, or lid surgery
    - When any of the above concerns are present, **ONE** of the following modalities is considered medically necessary:
      - MRI Orbits/Face/Neck without contrast (CPT® 70540)
      - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
      - CT Orbits/Temporal bone with contrast (CPT® 70481)
      - CT Orbits/Temporal bone without contrast (CPT® 70480)
      - CT head without contrast (CPT® 70450)
- Autoimmune Retinopathy
  - Suspicion for CAR (Cancer associated retinopathy) or MAR (melanoma associated retinopathy) syndromes (see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines)
- Oncologic conditions
  - Retinoblastoma (see **Retinoblastoma (PEDONC-12)** in the Pediatric and Special Populations Oncology Imaging Guidelines)
  - Uveal (choroidal) melanoma (see **Ocular Melanoma (ONC-5.9)** in the Oncology Imaging Guidelines)
  - Biopsy results are not required before initial staging
- Vasculitis including Temporal Arteritis (Giant Cell Arteritis) (see **Cerebral Vasculitis (HD-22.1)**)

Background and Supporting Information

- Imaging Non-Indications
  - Imaging is not necessary if visual loss or ocular symptom/sign is due to known intrinsic eye disease, such as refractive errors, amblyopia, pterygium, subconjunctival hemorrhage, conjunctivitis, cataracts, macular degeneration, central serous retinopathy, retinal vein occlusion, retinal detachment, etc. Monocular diplopia is not an indication for imaging. Physiologic anisocoria and surgically distorted pupils are not indications for imaging. Anisocoria may be

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physiologic or non-physiologic when the difference in pupil diameter between the two eyes is up to 2 mm.
    - Imaging is not typically necessary in cases of ptosis without concern for Horner's or 3rd nerve palsy
- Advanced imaging of the brain and orbit are not routinely paired.
    - Suspicion for disorders involving both regions is needed to image both regions.
    - Orbital imaging alone may be sufficient unless other signs or symptoms suggest brain involvement.
- Thyroid function and iodine contrast: thyroid dysfunction can occur in susceptible individuals after iodine exposure.

List of Abbreviations and Meanings:

Abbreviation	Meaning
AC	anterior chamber
APD	afferent pupillary defect (see RAPD)
BCVA	best-corrected visual acuity
C3F8	gas bubble injected into vitreous cavity during retina surgery
cc	with correction (current new or old glasses or contact lenses)
CP	color plates
C/S	conjunctiva/sclera
CSME	clinically significant macular edema
CVF	confrontation visual field (testing of gross field of view)
D	disc, optic nerve head
DBH	dot blot hemorrhages
DCR	dacryocystorhinostomy
DFE	dilated fundus exam
E	esophoria at distance
E'	esophoria at near

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Abbreviation	Meaning
EOM	extraocular movements
ERM	epiretinal membrane
ET	esotropia at distance
E(T)	inIntermittent esotropia at distance
ET'	esotropia at near
E(T)'	intermittent esotropia at near
GVF	Goldmann visual field test
HT	hypertropia
HVF	Humphrey visual field test (automated perimetry)
I	iris
Ishihara	commonly used color plates
IOP	intraocular pressure
K	cornea
LF	levator function
LFH	lid fissure height
LLL	lids, lashes, lacrimal gland
M	macula
ME	macular edema
MH	macular hole
MP	membrane peel
MRD1	margin-reflex distance from upper lid margin to pupillary light reflex
MRx	manifest refraction
NI	no improvement
NLDO	nasolacrimal duct obstruction

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Abbreviation	Meaning
NSC or NS	nuclear sclerotic cataract
OD	right eye
OS	left eye
ortho	eyes are aligned on the same target
OCT	optical coherence tomography
P	periphery
PD	prism diopter
ph or PH	pinhole (crude assessment of best-corrected visual acuity)
PPV or PPVx	pars plana vitrectomy
PVD	posterior vitreous detachment
RAPD	relative afferent pupillary defect (see APD)
RD	retinal detachment
RT	retinal tear
SB	scleral buckle
sc	without correction
SF6	gas bubble injected into vitreous cavity during retina surgery
SLE	slit lamp examination
SO	silicone oil
SRF	subretinal fluid
Ta	applanation tonometry (intraocular pressure measurement)
Tp	tonopen tonometry (intraocular pressure measurement)
V	vessels

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Abbreviation	Meaning
Va	visual acuity
VF	visual field testing (formal automated perimetry versus confrontation visual field testing)
X	exophoria at distance
X'	exophoria at near
XT	exotropia
X(T)	intermittent exotropia at distance
XT'	exotropia at near
X(T)'	intermittent exotropia at near

Evidence Discussion (HD-32.1)

- When evaluating suspected or known issues involving the eye, orbit, and/or brain, consideration must be given to:
  - whether or not imaging is required,
  - which body area should be imaged, i.e., brain, orbits, or both, and
  - which modality, MRI or CT, would best provide the information needed while exposing an individual to the least risk.
- The body area imaged should be reasonably expected to be potentially involved in the suspected condition. The angles of and distance between each view differ between brain imaging and orbital imaging. There are circumstances in which imaging of both the brain and orbits may be useful, as in conditions that can affect both locations or for which evaluation by the different techniques provides useful information.
- Soft tissue detail such as neural tissue is well-visualized by MRI.
- Calcification, bone, and hemorrhages are well-visualized by CT.
- MRI carries no risk of radiation exposure but is sensitive to motion, takes longer, and may require sedation or anesthesia for a longer duration than would be required for CT. Certain populations may have psychological or physical difficulty undergoing MRI scans, including children, those with obesity, movement disorders, anxiety, or claustrophobia.
- CT carries risk of radiation exposure but is less sensitive to motion and has a shorter duration than MRI. Imaging more than one body area increases the exposure dose.

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Certain populations may carry higher risk of detrimental effects from exposure, including children.

- Radiation exposure of the ocular lens contributes to cataract formation. Radiation doses vary between CT scans due to differences in scanning technique, number of images taken per CT, body area scanned, CT machines used, and facility protocols. The cancer risk of radiation exposure in diagnostic CT is considered extremely low, and the benefit of an appropriately indicated CT examination far outweighs the potential risk.(Watson 2023) Cataract formation is among the earliest radiation associated pathologies in the eye. The Beaver Dam Eye Study, a population-based study of common age-related eye diseases, found that nuclear sclerosis and posterior subcapsular opacity were significantly associated with CAT scans (Watson & Yu, 2023).

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Pupillary Abnormalities Including Horner Syndrome (HD-32.2)

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Criteria

- Examination of ocular complaints may include evaluation of pupillary responses, extraocular motility, visual acuity, visual field testing, intraocular pressures, external examination, slit lamp examination and/or funduscopic exam of the retinae. An exam performed by a neuro-ophthalmologist, ophthalmologist, neurologist, or an optometrist meets this requirement.
- Anisocoria and Other Pupillary Disorders
  - Physiologic anisocoria (difference in pupil diameter between the two eyes of typically 2 mm or less) and surgically distorted pupils are not indications for advanced imaging.
  - Dilated pupil from suspected Third nerve palsy (see **Eye Disorders and Visual Loss (HD-32.1)**)
  - Horner Syndrome (See below)
- Horner Syndrome (anisocoria, ptosis, and ipsilateral anhidrosis) is caused by disruption of sympathetic innervation to the eye and face. Definitive diagnosis may be established by pharmacologic testing of the pupillary response with eye drops. Evaluation and imaging depends on determining whether the cause is a central lesion (brainstem or cervical spinal cord), pre-ganglionic lesion (spinal cord or sympathetic chain in the chest), or post-ganglionic lesion (neck or carotid artery).
- Medically necessary imaging in the evaluation of Horner syndrome:
  - CT Head without contract (CPT® 70450) and/or CTA Head (CPT ® 70496) and/or CTA Neck (CPT® 70498)
    - CTA Head and Neck (CPT® 70471) if performed in the same session
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for suspected intracranial or brainstem lesions and/or MRA Head without contrast (CPT® 70544), with contrast (CPT® 70545), or without and with contrast (CPT® 70546) and or MRA Neck without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549.
  - MRI Cervical Spine without contrast (CPT® 72141) or MRI Cervical Spine without and with contrast (CPT® 72156) and/or MRI Thoracic spine without contrast (CPT® 72146) or MRI Thoracic spine without and with contrast (CPT® 72157) is considered medically necessary for suspected spinal cord abnormality

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- MRI Brachial plexus for Horner syndrome with traction or trauma to the brachial plexus
  - Any ONE of the following are considered medically necessary:
    - MRI Upper Extremity other than joint without contrast (CPT® 73218)
    - MRI Upper Extremity other than joint without and with contrast (CPT® 73220)
    - MRI Chest without contrast (CPT® 71550)
    - MRI Neck without contrast (CPT® 70540)
    - MRI Chest without and with contrast (CPT® 71552)
    - MRI Neck without and with contrast (CPT® 70543)
- CT Chest with contrast (CPT® 71260) or MRI Chest without and with contrast (CPT® 71552) is considered medically necessary for suspected chest mass
- CT Neck with contrast (CPT® 70491) or MRI Face/Neck/Orbits without and with contrast (CPT® 70543) is considered medically necessary for suspected neck mass
- MRI Orbits/Face/Neck without contrast (CPT® 70540), MRI Orbits/Face/Neck without and with contrast (CPT® 70543) or CT Orbits/Temporal bone with contrast (CPT® 70481) is considered medically necessary for suspected orbital lesion or mass
- For additional CT head without contrast (CPT® 70450) indications, see **General Guidelines - CT Head (HD-1.4)**, **Head Trauma (HD-13.1)**, **Facial Trauma (HD-13.2)**
- For Horner syndrome suspected due to an underlying occult malignancy or paraneoplastic syndrome, see **Paraneoplastic Syndrome (ONC-30.3)**.
- For Congenital Horner Syndrome see **Eye Disorders (PEDHD-31.1**) and **Neuroblastoma – Initial Staging (PEDONC 6.3).**

Evidence Discussion (HD-32.2)

- In the evaluation of Horner Syndrome, if a detailed clinical evaluation is unable to localize the site of the lesion, imaging of the entire course of the relevant oculosympathetic pathway is required, as symptoms may result from pathology affecting the nerve fibers at any point along the course of the pathway, requiring multiple imaging modalities (Expert Panel on Neurologic Imaging et al., 2022). MRI Brain, MRI Orbits/Face/Neck, MRI Cervical Spine and/or MRI Brachial plexus studies may be necessary, depending on the clinical presentation (Expert Panel on Neurologic Imaging et al., 2018; Lee & Brazis, 2007; Kawasaki 2014; Expert Panel on Neurologic Imaging et al., 2022).
- CT Neck is useful to exclude neck masses (Lee & Brazis, 2007; Expert Panel on Neurologic Imaging et al., 2022). CT may be complementary to MRI in characterizing skull base erosions, calcifications, and skull base foramina (Expert Panel on Neurologic Imaging et al., 2022).

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- For suspected lung masses associated with Horner syndrome, such as for evaluation of Pancoast tumors, chest imaging is recommended. A mass may be diagnosed on a CT Chest or an MRI Chest (Lee & Brazis, 2007; Kawasaki, 2014; Panagopoulos et al., 2014). CT scans provide 60% sensitivity, 65% specificity, and 63% accuracy in defining the local extent of tumor, in contrast to MRI with a sensitivity of 88%, a specificity of 100%, and an accuracy of 94% (Panagopoulos et al., 2014). MRI of the chest is a more accurate pre-operative examination in identifying the local extent of a Pancoast tumor (Panagopoulos et al., 2014).
- Causes of Horner syndrome include carotid dissection, brain stem infarction or ischemia, suprasellar tumors, lesions within the cavernous sinus, and demyelinating lesions. Of these, carotid dissection is the most catastrophic acute etiology. The initial workup is focused on first excluding this diagnosis and its associated complications. Carotid dissection is a common etiology of acute onset Horner syndrome, particularly in the setting of recent trauma or in association with pain (Dubey et al., 2025).

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Acoustic Neuroma and Other Cerebellopontine Angle Tumors (HD-33)

Guideline

Acoustic Neuroma and Other Cerebellopontine Angle Tumors (HD-33.1)
References (HD-33)

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Acoustic Neuroma and Other Cerebellopontine Angle Tumors (HD-33.1)

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Criteria

- Acoustic neuroma and vestibular schwannoma may be used interchangeably
- Initial diagnosis is usually made during evaluation for asymmetric hearing loss and/or vertigo (see **Dizziness, Vertigo and Syncope (HD-23)** and **Hearing Loss and Tinnitus (HD-27)**) for evaluation of those problems)
- MRI Brain without and with contrast (CPT® 70553), which should be done with attention to the internal auditory canals, is considered medically necessary for initial diagnosis.
- MRI Brain without contrast (CPT® 70551) is considered medically necessary if performed with FIESTA protocol
- MRI Orbits/Face/Neck without and with contrast (CPT® 70543) with audiologic or clinical features of retrocochlear hearing loss and a negative MRI Brain and in the rare individual in whom a detailed search is considered medically necessary for both a lesion of the cerebellopontine angle **and** lesions of the cerebral hemispheres
- Repeat MRI Brain (contrast as requested) is considered medically necessary 6 months after diagnosis, then annually for 5 years and thereafter per neurologist, neurosurgeon, or otolaryngologist, or any provider in consultation with a neurologist, neurosurgeon, or otolaryngologist.
- MRI Brain without and with contrast with attention to the internal auditory canals (CPT® 70553) is considered medically necessary after surgical resection and following stereotactic radiation therapy at 6 to 12 months to document the completeness of tumor removal and to serve as a baseline for further follow-up. Additional follow-up is done annually for 5 years and every 2 years thereafter.
- Limited MRI of the internal auditory canals (CPT® 70540, CPT® 70542, or CPT® 70543) is considered medically necessary when requested by the provider in place of a complete MRI Brain. Note: Limited MRI codes should not be used in addition to MRI Brain codes; IAC views are performed as additional sequences as part of the brain study. (See **General Guidelines – Anatomic Issues (HD-1.1)**)
- See **Primary Central Nervous System Tumors- General Considerations (ONC-2.1)** in the Oncology Imaging Guidelines for additional imaging requests for surgery

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Evidence Discussion (HD-33)

- MRI Brain is the preferred initial imaging modality for evaluation of persistent vertigo, vertigo associated with an abnormal neurologic exam, vertigo due to a suspected central cause, pulsatile or asymmetric tinnitus, and/or hearing loss (Wang et al., 2023; ACR 2024).
- CT Head is not recommended for the initial evaluation of suspected acoustic neuroma due to inferior soft tissue resolution when compared to MRI Brain. In addition, MRI Brain provides better visualization of the cerebellum, posterior fossa, and cranial nerves (Wang et al., 2023).
- MRI Brain, in this clinical scenario, is performed using specialized internal auditory canal (IAC) protocols, which include thin-section sequences to evaluate for vascular loops and small vestibular schwannomas (Expert Panel on Neurological Imaging et al., 2023).
- MRI Brain can diagnose lesions in the cerebellopontine angle including schwannoma, meningioma, and other posterior fossa tumors (Expert Panel on Neurological Imaging et al., 2023).
- 3D-Fast imaging employing steady state acquisition (3D-FIESTA) demonstrates significantly higher spatial resolution with superior imaging contrast between cranial nerves and CSF with a shorter acquisition time than conventional MRI scan (Zou & Hirvonen, 2017).
- Follow-up imaging is recommended 6 months after diagnosis to evaluate for rapid growth, then annually for 5 years (Olson et al., 2017; Goldbrunner et al., 2019; Somers et al., 2018). After 5 years, tumor growth that has remained stable is unlikely but may still occur, therefore, lifelong surveillance is advised with longer imaging intervals (Somers et al., 2018).
- Follow-up imaging after surgical resection and/or stereotactic radiosurgery to assess residual tumor and treatment response is performed at 6-12 months with additional follow-up annually for 5 years and every 2 years thereafter (Lin & Crane, 2017; Goldbrunner et al., 2019).

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Pineal/Colloid Cysts (HD-34)

Guideline

Pineal/Colloid Cysts (HD-34.1)
References (HD-34)

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Pineal/Colloid Cysts (HD-34.1)

HD.PT.0034.1.A
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Criteria

Pineal Cysts

Pineal cysts are generally discovered incidentally and do not require surgical intervention.

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for initial evaluation of pineal cysts if not already completed.
- Repeat MRI Brain is considered not medically necessary for most individuals with pineal cysts, but MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for the following:
  - New or worsening headache or focal neurologic deficits suggesting progression of cyst
  - Pre-operative planning

Colloid Cysts

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for the initial evaluation of colloid cysts if not already completed.
- Repeat MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is considered medically necessary for colloid cysts for the following:
  - In the presence of symptoms including syncope
  - Evaluation of CSF flow (CPT® 70551)
  - When requested by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon

Evidence Discussion (HD-34)

- MRI Brain is the preferred modality for the evaluation of intracranial cysts, due to its superior soft tissue resolution when compared to CT Head (Ajtai & Bertelson 2016, ACR 2024)
- Follow-up imaging of pineal cysts is supported for new or worsening headaches, focal neurologic deficits, and/or for surgical planning, otherwise, routine follow up is not supported (Tanaka et al., 2021; Jussila et al., 2017).
- In contrast to pineal cysts, colloid cysts may lead to sudden obstruction of cerebrospinal fluid flow at the foramen of Monro, resulting in neurologic symptoms,

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including syncope. Other than this scenario, follow-up imaging indications are similar to pineal cysts (Ajtai & Bertelson, 2016; Velicu et al. 2023).

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Arachnoid Cysts (HD-35)

Guideline

Arachnoid Cysts (HD-35.1)
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Arachnoid Cysts (HD-35.1)

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Criteria

Arachnoid cysts arise in the middle or posterior fossa, and the majority of lesions are discovered incidentally and do not require surgical intervention.

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for initial evaluation of arachnoid cysts if not already completed.
- Repeat MRI Brain is considered not medically necessary for most individuals with arachnoid cysts, except in the following scenarios:
  - New or worsening headache or focal neurologic deficits suggesting progression of cyst
  - Pre-operative planning
  - When requested by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon

Evidence Discussion (HD-35)

- MRI Brain is the preferred modality for evaluation and follow up of intracranial arachnoid cysts, due to its superior soft tissue resolution when compared to CT Head (Ajtai & Bertelson, 2016; ACR, 2024).
- Most intracranial arachnoid cysts remain asymptomatic and follow up imaging is not routinely supported. Surgical intervention is reserved for those with symptoms (Ajtai & Bertelson, 2016; Hall et al., 2019).

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Nuclear Medicine (HD-36)

Guideline

Nuclear Medicine (HD-36.1)
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Nuclear Medicine (HD-36.1)

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Criteria

Nuclear medicine studies used in the evaluation of some head/brain disorders, and other rare indications as well.

- Brain Scintigraphy with or without vascular flow (any one of CPT® 78600, CPT® 78601, CPT® 78605, or CPT® 78606)
- Brain Imaging Radiopharmaceutical Localization SPECT (CPT® 78803)
  - Immunocompromised individuals with mass lesion detected on CT or MRI for differentiation between lymphoma and infection
  - In distinguishing recurrent brain tumor from radiation necrosis
  - Can be performed with vasodilating agent acetazolamide (Diamox) to assess functional reserve capacity to predict critically reduced perfusion in individuals with chronic cerebrovascular disease (for example, in Moyamoya disease) and identify individuals who might benefit from an extracranial-to-intracranial (EC-IC) bypass to augment Cerebral Blood Flow, and to assess pre-operatively the potential for ischemia following carotid artery sacrifice. See **Moyamoya Syndrome/Disease (HD-21.5)**
- Brain Imaging Vascular Flow (CPT® 78610)
  - Cerebral ischemia
  - Establish brain death
- CSF Leakage Detection (CPT® 78650)
  - Evaluation of CSF rhinorrhea, otorrhea, or refractory post-lumbar puncture headache
  - Suspected normal pressure hydrocephalus with gait disturbance and either dementia or urinary incontinence
- Radiopharmaceutical Dacryocystography (CPT® 78660)
  - Suspected obstruction of nasolacrimal duct due to excessive tearing
- Cisternogram (CPT® 78630), see **Low-Pressure Headache and CSF Leak (HD-11.15)** and **Facial Trauma (HD-13.2)**
- Cerebrospinal Ventriculography (CPT® 78635) and Nuclear Medicine Shunt Evaluation (CPT® 78645) and CSF Flow SPECT (CPT® 78803), see **Hydrocephalus Shunts (HD-11.14)**
- DAT-SPECT **OR** Fluorodopa F (F-DOPA) PET Brain see **Lewy Body Dementia (LBD) – SPECT Brain Scan and PET (HD-8.3)** and **Movement Disorders (HD-15.1))**

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- Jaw Asymmetry - see **Temporomandibular Joint Disease (HD-30.1)**

Evidence Discussion (HD-36)

- Nuclear medicine studies are adjunct, functional imaging modalities in the evaluation of a variety of neurologic conditions and are generally helpful when structural brain imaging modalities are unable to provide answers to complex clinical questions.
- The American Academy of Neurology practice guideline recommends brain SPECT to assist with prognostication in adults with traumatic brain injuries (Giacino et al., 2018).
- Single-photon emission CT (SPECT) is the most readily available nuclear medicine technique for assessment of cerebral hemodynamics (Vagal et al., 2009). Brain SPECT has also been validated for evaluation of cerebrovascular reactivity to acetazolamide (ACZ) challenge in individuals with various types of vaso-occlusive disease, including Moyamoya disease (Vagal et al., 2009; Latchaw et al., 2003).
- Brain SPECT has been used in the evaluation of stroke, TIA, monitoring of medical or surgical therapy, assessment of cerebral blood flow reserve, and estimation of prognosis. The sensitivity of brain SPECT for acute stroke localization is 85.5% with a specificity of 97.6% (Camargo, 2001).
- Brain SPECT used with specific perfusion agents is useful in distinguishing radiation effects from residual or recurrent tumor, and/or for distinguishing cerebral lymphoma from infection, a distinction not always possible with CT or MRI (Carmargo, 2001).
- Dacryocystography is supported to localize the lacrimal drainage system and evaluate for suspected obstruction in the nasolacrimal duct (Singh & Paulsen, 2019).
- Radionuclide CSF shunt studies can evaluate shunt patency, differentiate proximal versus distal obstruction, and localize the site of obstruction. The combination of CT and radionuclide is more sensitive than CT alone in diagnosing shunt malfunction (Wallace et al., 2014).
- CT head cisternography in the evaluation of CSF leak has a sensitivity range between 85%-92%. This modality is particularly useful when there are multiple potential CSF leak sites. Radionuclide cisternography is useful for confirming the presence of a CSF leak (Shih et al., 2021).

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Sleep-Related Imaging (HD-37)

Guideline

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General Guidelines Sleep-Related Imaging (HD-37.1)

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Criteria

- Hypersomnolence:
  - When there are focal neurologic signs or suspicion for an inflammatory neurologic process as the etiology. Recognition and treatment of a comorbid sleep disorders is paramount, and a complete neurologic history and examination should precede any request for advanced imaging.
    - MRI Brain without and with contrast (CPT® 70553) **OR**
    - MRI Brain without contrast (CPT® 70551)
- Central Sleep Apnea:
  - For unexplained central sleep apnea syndrome when a primary CNS etiology is suspected, i.e., unassociated with CHF, COPD, or other potential etiology. Specific etiologies should be stated for imaging requests, including but not limited to, suspected Chiari malformation, stroke, CNS demyelinating disease, posterior fossa lesion, anoxia, or infection.
    - MRI Brain without and with contrast (CPT® 70553) **OR**
    - MRI Brain without contrast (CPT® 70551)
- Obstructive Sleep Apnea (OSA):
  - Advanced imaging is considered not medically necessary in the evaluation and management of obstructive sleep apnea.
  - The gold standard for OSA diagnosis, evaluation and management is a sleep study.
  - See **Initial Sleep Diagnostic and Treatment Testing (SL-2.1)**
- Oral Appliance:
  - There is a lack of published case-controlled clinical studies in Sleep literature validating the use of advanced imaging with respect to oral appliance therapy (pre-treatment assessment).
  - Previous literature has demonstrated support for cephalometric studies (x-ray) in predicting treatment success.
  - Nasoendoscopy (sedated and non-sedated with provocative maneuvers such as Mueller maneuver) has been helpful as well in this regard.
  - Routine use of advanced imaging is considered not medically necessary at this time.

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- Upper Airway Surgery:
  - There is a lack of published case-controlled clinical studies in sleep literature validating the use of advanced imaging for upper airway surgery (pre-treatment assessment).
    - Examples of upper airway surgery include, but are not limited to, hypoglossal nerve stimulation, uvulopalatopharyngoplasty (UPPP), turbinate reduction, and nasal septoplasty
  - For congenital anomalies, see **Craniosynostosis Imaging (PEDHD-8.1)** and **Facial Anomalies (PEDHD-8.2)**
  - For dentofacial abnormalities, see **Dental/Periodontal/Maxillofacial Imaging (HD-30.2)**
  - Routine use of advanced imaging is considered not medically necessary at this time.
- For suspected sleep-related seizure imaging (see **Epilepsy and Other Seizure Disorders (HD-9)**)

Evidence Discussion (HD-37.1)

- An individual's management is rarely impacted by structural brain imaging in the evaluation of unexplained hypersomnolence. Instead, a thorough evaluation can result in an accurate diagnosis while safeguarding individuals from unnecessary exposure to radiation and over-reliance on incidental imaging findings as potential contributors to the symptom(s).
- Literature supports use of drug-induced sleep endoscopy (DISE) to predict effectiveness of upper airway surgery, particularly in individuals seeking upper airway stimulation or maxillomandibular advancement (Chang et al., 2023; Liu et al., 2020).
- Studies have demonstrated how upper airway MRI and CT can be used to determine sites of collapse in OSA patients (Volner et al., 2022; Li et al., 2016). Information from imaging could assist with determining which surgical interventions should be considered. Additionally, imaging may be helpful to determine why upper airway surgery is ineffective post-surgically (Volner et al., 2022). However, there are no large clinical trials that have shown improved surgical outcomes utilizing data from pre-treatment advanced imaging for OSA.
- The appropriate step in care for individuals with disordered sleep is to evaluate their breathing with polysomnography. Advanced imaging can lead to gaps in care and ineffective treatment of disordered sleep patterns. Instead, emphasis should be placed on holistic evaluation, including sleep history and sleep testing. Radiography (x-rays), 3D Advanced Imaging, or dynamic nasopharyngoscopy are not supported by evidence to being superior over polysomnography at this time.

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General Guidelines (MS-1.0)

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These musculoskeletal (MSK) imaging guidelines are intended for the further investigation of non-spinal, MSK conditions or concerns (e.g., shoulder, elbow, wrist, hand, arm, pelvis, hip, knee, ankle, leg, foot). Imaging guidelines for spinal conditions or concerns are located in **Spine Imaging Guidelines.**

General Criteria

Before any request for advanced diagnostic imaging of musculoskeletal concerns will be considered, ALL of the following must be complete and clearly documented. The following criteria apply to all requests for advanced imaging; details, or exceptions, will be provided within each specific section throughout the guideline:

- There must be an in-person clinical evaluation, as well as a clinical re-evaluation following any required conservative care as outlined throughout the guideline.
- An in-person clinical evaluation that includes a complete relevant medical history, physical examination, appropriate laboratory studies and initial non-advanced imaging (e.g., plain radiographs) should have been completed after the current episode of symptoms began. The in-person clinical evaluation may be, at least, either the initial or the re-evaluation.
  - Prior to advanced imaging consideration, the results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the provider that is requesting the advanced imaging.
- When necessary, clinical re-evaluation is required prior to consideration of advanced diagnostic imaging to document failure of clinical improvement following a trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed as follows:
  - A documented trial of conservative care lasting at least six weeks in duration
  - A clinical re-evaluation or documentation of other meaningful contact (e.g., email, telephone, video consult) with the provider's office following the initial evaluation
  - Details will be in the specific criteria sections throughout this publication regarding when conservative treatment is required.

Repeat, Serial or Multiple Studies

The need for repeat or serial advanced imaging, whether CT or MRI, should be considered carefully and may not be medically necessary. This includes serial imaging for surveillance of healing or recovery from musculoskeletal disease. In the majority of

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musculoskeletal conditions, the medical evidence (i.e., documentation) does not support the need for repeat imaging.

In hand and wrist advanced imaging, as well as in foot and ankle imaging, studies are frequently ordered of both areas. This is not medically necessary since wrist imaging will capture from above the wrist to the mid-metacarpal area, and ankle imaging will capture from above the ankle to the mid-metatarsal area. Only one CPT® code per area should be reported.

Health Equity Considerations

Health equity is the highest level of health for all people; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which people are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include safe housing, transportation, and neighborhoods; racism, discrimination and violence; education, job opportunities and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Evidence Discussion (MS-1)

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Advanced imaging is typically not necessary for the initial evaluation of individuals with a musculoskeletal complaint. A diagnosis can often be made based on a detailed history, physical examination, appropriate laboratory tests and/or plain radiographs or initial ultrasound (US) (American College of Radiology, n.d.; Karel et al., 2015; Garner et al., 2023; Alfuraih et al., 2022; Davis et al., 2015). Many individuals' complaints can improve within a few weeks to months with conservative care.

The American College of Radiology Appropriateness Criteria recommended that x-rays, or US in a few select scenarios, be used as the initial imaging modality for most musculoskeletal complaints (American College of Radiology, n.d.; Garner et al., 2023). These initial images can be helpful in determining if a course of conservative treatment is recommended. In some instances, the initial x-rays or US may help determine a diagnosis or that more advanced images or procedures are appropriate (Cuff et al., 2020). If conservative treatment is unsuccessful or more advanced study is needed, the initial images can be helpful in determining the next course of action (Cuff et al., 2020; Pompan, 2011). These initial images can be helpful in pre-operative planning when surgery is being considered (American College of Radiology, n.d.; Garner et al., 2023).

Advanced imaging can often demonstrate abnormalities that have no relevance to the individuals' symptoms. Studies have shown that advanced imaging of asymptomatic middle age individuals commonly demonstrate musculoskeletal abnormalities that do not affect their quality of life (Schwartzberg et al., 2016). Focusing on incidental findings can lead to overtreatment through unnecessary referral to medical specialists or unneeded medical procedures. Advanced imaging can have additional risks to the individual beyond those of initial plain images. There are risks associated with additional exposure to radiation. There can also be complications due to implantable devices or metallic foreign bodies in the individual. Risk mitigation needs to be weighed when advanced imaging is being considered, especially in relation to repeat or serial advanced imaging (Watson & Yu, 2023).

In many instances for musculoskeletal complaints, current evidence has supported the recommendation of obtaining initial plain x-rays, or US when appropriate, and having the individual follow a course of provider directed conservative care prior to seeking advanced imaging studies (American College of Radiology, n.d.). The potential clinical benefit of starting conservative care and not needing advanced images or additional procedures may outweigh the potential harm of a brief delay of obtaining said imaging. It may also help to reduce the risk of unnecessary exposures to radiation/chemicals associated with the advanced imaging techniques (Pompan, 2011; Watson & Yu, 2023).

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Imaging Techniques (MS-2)

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Imaging Techniques (MS-2)

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Plain Radiograph

Plain radiographs (x-ray) are often the initial imaging for musculoskeletal conditions. The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the provider requesting advanced imaging, unless otherwise noted, to rule out those situations that do not often require advanced imaging, such as osteoarthritis, acute/healing fracture, dislocation, osteomyelitis, and bone tumor amenable to biopsy or radiation therapy (in known metastatic disease). Unless otherwise noted in the guidelines, x-rays should be performed before requesting advanced imaging.

Magnetic Resonance Imaging

Magnetic resonance imaging (MRI) is often a preferred advanced imaging modality in MSK conditions because it can be superior in visualizing the soft tissues and physiological processes happening due to an injury or medical condition. As MRI uses magnetic fields, it does not expose the individual to ionizing radiation and may be a better choice when exposure is a concern. However, individuals with implanted devices may not be able to undergo MRI.

Currently there is inadequate scientific evidence to support the necessity of positional MRI (also referred to as dynamic, weight-bearing, standing, or kinetic MRI) and delayed gadolinium enhanced MRI of cartilage (dGEMRIC). These imaging modalities should be considered not medically necessary.

Computed Tomography

Computed tomography (CT) is preferred for imaging cortical bone anatomy. It is useful for studying complex fractures, dislocations, and assessing delayed union or non-union of fractures when x-rays are equivocal. CT can also be the imaging choice in individuals who cannot undergo an MRI.

Positional CT (also referred to as weight-bearing or cone beam CT) may be useful in imaging of the foot and ankle. Requests for positional CT for the foot and ankle are subject to the same condition-specific criteria as contained throughout this guideline publication. Positional CT of anatomic areas other than the foot and ankle are considered not medically necessary.

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Ultrasound

Ultrasound (US) uses sound waves to produce images that can be used to evaluate a variety of musculoskeletal disorders. US is highly operator dependent and proper training and experience are required to perform consistent, high-quality evaluations.

Nuclear Medicine

A bone scan is a nuclear medicine imaging study in which an amount of radioactive material is injected and images are obtained at different time intervals, depending on the condition. A bone scan is done to reveal problems with bone metabolism. Areas where bone cells are repairing themselves show the most activity. It can help diagnose a number of bone conditions, including cancer of the bone or metastasis, location of bone inflammation, fracture, and bone infection.

Nuclear Medicine WBC Scan is performed using radioactive material which is tagged to the white blood cells. When injected into the body, the material attaches to sites of inflammation/infection. Once distributed in these areas, the sites of suspected infection/ inflammation can be seen on nuclear imaging equipment. These can be imaged as a planar study, SPECT study, or SPECT/CT study.

Bone Marrow Imaging is used in combination with a WBC Scan to help differentiate between true infection and physiological marrow uptake. The bone marrow scan provides a map of the normal physiological white cell uptake that is then compared to the white blood cell scan. Any discordance in white cell uptake (e.g., more WBC uptake than marrow uptake) between the two studies indicates a focus of infection.

Positron Emission Tomography

Positron Emission Tomography (PET/CT) is a nuclear medicine/CT fusion study that uses a positron emitting radiotracer to create cross-sectional and volumetric images based on tissue metabolism. PET/CT allows for better anatomic localization of the areas of abnormal increased tissue activity. PET/CT can be helpful for imaging certain musculoskeletal conditions when MRI or CT is equivocal or cannot be performed.

- See: **Nuclear Medicine (MS-28)** and condition specific guidelines for specific indications.

Contrast Issues

Most musculoskeletal imaging (MRI or CT) is completed without contrast media; however, contrast may be useful and will be indicated throughout the condition-specific criteria in these guidelines. Some examples may be tumors, osteomyelitis, infection, arthrograms, detection of rheumatoid arthritis. For individuals with contrast contraindication, the corresponding advanced imaging without contrast may be approved as an alternative. However, in some cases, the non-contrast study may not

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provide as adequate evaluation of the condition of concern and would therefore not be considered medically necessary.

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3D Rendering (MS-3)

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3D Rendering (MS-3.1)

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Criteria

3-D image post-processing of conventional images is considered medically necessary for preoperative planning when conventional imaging is insufficient for the following:

- Complex fractures (comminuted or displaced)/dislocations of any joint
- Spine fractures, pelvic/acetabulum fractures, intra-articular fractures
- Preoperative planning for other complex surgical cases

The code assignment for 3-D rendering depends upon whether the 3-D post-processing is performed on the scanner workstation (CPT® 76376) or on an independent workstation (CPT® 76377)

- 2-D reconstruction (i.e., reformatting axial images into the coronal plane) is considered part of the tomography procedure, is not separately reportable, and does not meet the definition of 3-D rendering.
- It is not considered medically necessary to report 3-D rendering in conjunction with CTA and MRA because those procedure codes already include the post-processing.
- In addition to the term "3-D," the following terms may also be used to describe 3-D post-processing:
  - Maximum intensity projection (MIP)
  - Shaded surface rendering
  - Volume rendering
- Additionally - If multiple CPT codes are performed for the same indication on the same day, one 3-D rendering code is required. If they are performed on separate days, 3-D rendering codes are required for each study on each day.
- The 3-D rendering codes require concurrent supervision of image post-processing 3-D manipulation of volumetric data set and image rendering.

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In some complex clinical scenarios, initial and conventional advanced images alone may not sufficiently reveal bony displacement and other incongruities. Accurate radiographic characterization of complex fractures and injuries is important for appropriate treatment decisions. The American College of Radiology, in multiple of their Appropriateness Criteria (ACR) publications, supports the use of 3D image post-processing of conventional images of complex fractures and injuries when said images are insufficient to visualize bone displacement and/or incongruity, and further clarification will aid in treatment decisions (Bartolotta et al., 2024; Chen et al., 2024; Laur et al., 2024).

Evidence has shown that 3D modeling can improve the accuracy of fracture classification. In a cohort study comparing the use of 2D CT images alone or combined with 3D segmentation or 3D models, both trauma surgeons and residents were more accurate with their classification of proximal humerus fractures when they used digital 3D models (Dauwe et al., 2022). In a systematic review, inter- and intra-observer agreement in proximal humeral fracture classification increased as image technology advanced from radiographs to 2D CT to 3D CT (Bougher et al., 2020). Fracture gaps of 100µm were identified at a consistent rate of 80-100% in CT images with displacements of up to 400µm visible in digital 3D models. However, rates were dependent on CT technology and post-processing effects of rendering; thus original CT images should still be used along with any 3D rendering for verification of fractures prior to surgery (Bittner-Frank et al., 2025).

In their Appropriateness Criteria for acute trauma to the hand and wrist, the ACR supports the use of 3D rendering as a visualization tool for more accurate preoperative planning in the management of some complex surgical procedures (Torabi et al., 2018). Additional evidence demonstrated the utility of 3D rendering in preoperative planning for various complex musculoskeletal conditions. In a retrospective study of the planning of reinforcement cages for total-hip replacement revision surgery, 3D templating accurately predicted cage size in 29/27 surgeries, compared to only 15/27 using conventional 2D templating (Winter et al., 2023). 3D preoperative planning for reverse total shoulder arthroplasty has been shown to result in minimal deviation of the procedure from the plan with high levels of agreement in screw angle, length and prosthetic component size (Lilley et al., 2022). In a comparison of 2D versus 3D preoperative planning in total hip arthroplasty, 3D templating was found to result in higher accuracy restoration of native joint mechanics (Fontalis et al., 2024).

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Nuclear Medicine (MS-28)

Guideline

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Nuclear Medicine (MS-28.1)

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Criteria

As mentioned in General Guidelines (MS-1.0), results of plain x-rays after the current episode of symptoms started or changed must be available to the requesting provider, unless otherwise specified below, prior to advanced imaging. A trial of conservative care may also be required, as specified below.

NOTE: SPECT scan may be considered medically necessary for any of the same criteria for which a bone scan is considered medically necessary as listed in this section if:

- The request is for CPT® 78300 and CPT® 78803, then only CPT® 78803 is to be approved if medical necessity is established.
- The request is for CPT® 78305 or CPT® 78306 and CPT® 78803, then two CPT® codes may be approved if medical necessity is established.

Nuclear Medicine may be considered medically necessary in the evaluation of some musculoskeletal disorders, and other rare criteria as follows:

- Evaluation of suspected aseptic loosening of orthopedic prostheses when recent plain x-ray is nondiagnostic:
  - Bone scan (CPT® 78315) OR
  - Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831) OR
  - Hybrid SPECT/CT (CPT® 78830)
  - Criteria for non-nuclear medicine imaging can be found in: **Joint Replacement Post-Operative Follow-Up (MS-16.1)**
- For detection of ischemic or infarcted regions in sickle cell disease:
  - Nuclear medicine bone marrow imaging (CPT® 78102, 78103, or 78104) OR
  - SPECT (CPT® 78803) OR
  - Hybrid SPECT/CT (CPT® 78830)
  - See also: **Modality General Considerations (PEDMS-1.3)**
- Evaluation of complex regional pain syndrome or reflex sympathetic dystrophy, after documented failure of six weeks provider-directed conservative treatment, including re-evaluation, occurring after the current symptoms or physical exam findings started or changed:
  - Triple phase bone scan (CPT® 78315)

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- Criteria for non-nuclear medicine imaging of CRPS of the foot can be found in: **General Pain (MS-32.1)**

- Evaluation of Paget's disease
  - Bone scan (CPT® codes: 78300, 78305, or 78306) OR
  - Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) OR
  - Hybrid SPECT/CT (CPT® 78830)
  - Criteria for non-nuclear medicine imaging can be found in: **Bone Lesion (MS-10.2)**
- Suspected fractures
  - If the following criteria listed below (as also found in **Occult, Stress or Insufficiency Fracture or Reaction (MS-5.2)**) (**excluding peri-prosthetic fractures**) are met:
    - For suspected hip/femoral neck, tibia, pelvis/sacrum, tarsal navicular, proximal fifth metatarsal, or scaphoid occult/stress/insufficiency fractures, and suspected atypical femoral shaft fractures related to bisphosphonate use when ALL the following apply:
      - The initial evaluation, history, and physical exam fails to establish a definitive diagnosis AND
      - The initial plain x-ray findings are negative or equivocal
      - CT without contrast can be performed as an alternative to MRI for suspected occult/insufficiency fractures of the pelvis/hip and suspected atypical femoral shaft fractures related to bisphosphonate and suspected occult fractures of the scaphoid
    - Or for all other suspected occult/stress/insufficiency fractures when ANY of the following apply:
      - Initial plain x-rays obtained a minimum of 14 days after the onset of symptoms are non-diagnostic for fracture OR
      - Repeat plain x-rays remain non-diagnostic for fracture after a minimum of 10 days of provider-directed conservative treatment
      - For suspicion of shin splints, a documented 6-week trial of provider-directed conservative treatment, occurring after the current episode of symptoms started or physical exam findings started or changed, including clinical re-evaluation, is also required prior to requesting advanced imaging.
      - For stress reaction surveillance or "return to play" decisions, advanced imaging is considered not medically necessary regarding a stress reaction identified on an initial imaging study.
      - For stress fracture follow-up imaging for "return to play" evaluation at least 3 months after the initial imaging study.

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- **And MRI cannot be performed**, the following imaging is considered medically necessary:
  - Tc-99m bone scan whole-body (CPT® 78306) with SPECT of the area of interest (CPT® 78803) OR
  - Hybrid SPECT/CT (CPT® 78830) OR
  - Bone scan (CPT® 78315, 78305, or 78300)
- **Or for peri-prosthetic fractures when MRI cannot be performed**, the following imaging is considered medically necessary:
  - Tc-99m bone scan whole-body (CPT® 78306) with SPECT of the area of interest (CPT® 78803) OR
  - Hybrid SPECT/CT (CPT® 78830) OR
  - Bone scan (CPT® 78315, 78305, or 78300)

- Evaluation of suspected bone infection if MRI or CT cannot be done and when infection is multifocal, or when the infection is associated with orthopedic hardware or chronic bone alterations from trauma or surgery:
  - **Note** - For suspected infection following joint replacement, joint aspiration is the initial evaluation after plain x-ray for a painful joint replacement. Joint aspiration should be negative or inconclusive prior to requesting advanced imaging.
    - Criteria for non-nuclear medicine imaging regarding specific joints post-operative from replacement surgery can be found in: **Joint Replacement Post-Operative Follow-Up (MS-16.1)**
  - FDG PET/CT (CPT® 78815 for multifocal infection, or CPT® 78811 for unifocal/limited area of interest) if MRI or CT is equivocal or cannot be done
    - At this time, FDG is the only indicated radiotracer for use with PET/CT in the imaging of musculoskeletal conditions
  - Bone scan (CPT® 78315, 78300, 78305, or 78306) OR
  - Distribution of radiopharmaceutical agent SPECT (CPT® 78803 or 78831) OR
  - Hybrid SPECT/CT (CPT® 78830 or 78832)
  - A labeled leukocyte scan (radiopharmaceutical inflammatory imaging - one of CPT® codes: 78800, 78801, 78802, or 78803) in concert with Tc-99m sulfur colloid marrow imaging (one of CPT® codes: 78102, 78103, or 78104)

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Evidence Discussion (MS-28)

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Many musculoskeletal complaints can be diagnosed based on a detailed history, physical examination, and initial x-rays. In more complex clinical situations, x-rays can be useful in determining whether advanced diagnostic imaging is needed and which specific advanced diagnostic imaging study is warranted. MRI or CT are typically the study of choice if x-rays are non-diagnostic or equivocal in evaluating musculoskeletal complaints. While nuclear medicine scans may demonstrate high sensitivity to certain diagnoses, the increased exposure to radiation must be considered in comparison to other advanced imaging options (Palestro et al., 2021; Salvatori et al., 2019).

The American College of Radiology (ACR) has recommended the use of MRI, when possible, as the next image after x-rays for investigation of suspected infection, stress fracture and post-surgical complications following joint replacement. MRI can be as sensitive as nuclear medicine scans but also considerably more specific, while creating less radiation exposure. However, there may be situations where MRI or CT are not available, contraindicated, or image results would be unclear (Baker et al., 2025; Morrison et al., 2024; Palestro et al., 2021; Pierce et al., 2022; Walker et al., 2023; Weissman et al., 2023).

Implanted hardware, devices, or foreign objects may create image artifacts making diagnosis uncertain. In these situations, nuclear medicine scans may be the next best option in imaging. Practical planning to keep radiation exposure as low as possible must be taken into account (Salvatori et al., 2019). Bone scans have been shown to be as sensitive to stress fracture as MRI, allowing earlier detection than may be shown on plain x-ray (Morrison et al., 2024). When an alternative imaging modality to other advanced imaging is necessary to evaluate suspected infection, bone scans have demonstrated high sensitivity to osteomyelitis. However, their specificity has been shown to be limited (45%), especially when there are other underlying conditions (e.g., arthritis), recent fracture, or recent surgery (Baker et al., 2025; Pierce et al., 2022). Bone scan may also have similar sensitivity and specificity as MRI when evaluating suspected complex regional pain syndrome, type 1 and may be useful to rule-out the diagnosis (Tafur et al., 2020).

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Arthritis and Joint Degeneration (MS-12)

Guideline

Osteoarthritis (MS-12.1)
Inflammatory Arthritis (MS-12.2)
Evidence Discussion (MS-12)
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Osteoarthritis (MS-12.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning of osteoarthritis. See specific details below regarding any requirements for conservative care prior to requesting advanced imaging.

Non-surgical and surgical treatment planning, other than joint replacement

- Osteoarthritis - CT without contrast for further investigation of osteoarthritis is considered medically necessary when ALL of the following apply:
  - Requested for treatment planning, AND
  - Congenital or significant atypical post-traumatic arthritic deformities are identified on plain x-ray, AND
  - The aforementioned deformities require further evaluation of their clinical significance, AND
  - The request is related to the shoulder, elbow, wrist, hip, knee, or ankle
- Reconstructive joint sparing/salvage surgery planning - MRI arthrogram or CT arthrogram for joint sparing/salvage reconstructive surgery planning is considered medically necessary for the following:
  - Suspected concomitant rotator cuff tear of the shoulder
  - Suspected concomitant labral tear of the shoulder or hip
  - Suspected concomitant internal derangement of the knee

Joint replacement planning, non-customized-to-patient (not for intra-operative navigation)

- **Elbow, wrist, hip, knee or ankle** - CT without contrast of the elbow (CPT® 73200), wrist (CPT® 73200), hip (CPT® 73700 or 72192), knee (CPT® 73700) or ankle (CPT® 73700) for non-customized-to-patient joint replacement planning (prior to surgery/not for intra-operative navigation) is considered medically necessary when ALL of the following apply:
  - Initial x-rays have been performed after the current episode of symptoms started or changed and results are available to the requesting provider AND

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- Congenital or significant atypical post-traumatic arthritic deformities are identified on plain x-ray AND
- The aforementioned deformities require further evaluation of their clinical significance

- **Shoulder** - CT without contrast (CPT® 73200) and MRI without contrast (CPT® 73221) of the shoulder for non-customized-to-patient joint replacement planning (prior to surgery/not for intra-operative navigation) is considered medically necessary when ALL of the following apply:
  - Initial x-rays have been performed after the current episode of symptoms started or changed and results are available to the requesting provider

Joint replacement planning and intraoperative navigation, customized-to-patient

- CT without contrast or MRI without contrast of the **shoulder, elbow, wrist, hip, knee, or ankle** for customized-to-patient joint replacement surgery planning and intraoperative navigation (e.g., MAKOplasty) is considered medically necessary when ALL of the following apply:
  - Initial x-rays have been performed after the current episode of symptoms started or changed and results are available to the requesting provider AND
  - The joint replacement surgery has been approved or does not require prior authorization
- The preoperative imaging listed above is considered not medically necessary if any of the following are deemed not medically necessary, not a covered benefit, or experimental, investigational, or unproven by the health plan:
  - Joint replacement surgery
  - Customized-to-patient implant
  - Computer assisted surgical navigation (e.g. MAKOplasty)
- See: Unlisted **Procedures/Therapy Treatment Planning (Preface-4.3)** in the Preface Imaging Guidelines

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Inflammatory Arthritis (MS-12.2)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning of inflammatory arthritis (e.g., Gout, Pseudogout, Pigmented Synovitis, Rheumatoid arthritis).

Gout/Pseudogout

CT without contrast, MRI without contrast, or MRI without and with contrast of the area of interest is considered medically necessary for investigation of suspected gout/ pseudogout when ALL of the following are met:

- Initial plain x-ray to rule out other potential disease processes
- Infection or neoplasm is in the differential diagnosis for soft-tissue tophi

Pigmented Villonodual Synovitis (PVNS)

Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider prior to requesting advanced imaging for PVNS

MRI without contrast of the affected joint, or CT with contrast if MRI contraindicated, is considered medically necessary for the investigation of PVNS following plain x-rays.

Rheumatoid Arthritis

Plain x-ray, physical exam, and appropriate laboratory studies are required prior to advanced imaging for rheumatoid arthritis

- Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- Examples of appropriate laboratory studies may include: Lyme titers, rheumatoid factor (RF), anti-cyclic citrullinated peptide (anti-CCP), sedimentation rate (ESR), C-reactive protein (CRP), and antinuclear antibody (ANA), joint fluid analysis

MRI without contrast OR MRI without and with contrast is considered medically necessary for investigation of rheumatoid arthritis in the most symptomatic joint, or of the dominant hand or wrist, in ALL of the following situations:

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- When diagnosis is uncertain prior to initiation of drug therapy
- To study the effects of treatment with disease modifying anti-rheumatic drug (DMARD) therapy
- To identify seronegative RA individuals that might benefit from early DMARD therapy
- To determine change in treatment, such as:
  - Switching from standard DMARD therapy to tumor necrosis factor (TNF) therapy.
  - Changing to a different TNF drug therapy, then one MRI (contrast as requested) of a single joint can be performed.
  - Addition of other treatments, including joint injections
- MRI is considered not medically necessary for routine follow-up of treatment

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Evidence Discussion (MS-12)

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Current ACR appropriateness criteria for chronic pain in the shoulder, knee, and hip all recommended plain x-ray as the initial image of choice when investigating suspected osteoarthritis (OA) (Fox et al., 2018; Jawetz et al., 2022; Nacey et al., 2022). Advanced imaging is typically not necessary for the initial evaluation of OA; a diagnosis can be made based on history, physical exam and plain x-rays (Henry-Blake et al., 2023). For most individuals diagnosed with OA, treatment does not rely on advanced imaging findings, and many can improve with conservative care (Brophy & Fillingham, 2022; Michener et al., 2023; U.S. Department of Veterans Affairs & U.S. Department of Defense, 2020; van Doormaal et al., 2020).

When individuals with OA poorly respond to conservative care or there is a concern for concomitant joint pathology, advanced imaging may be able to identify additional sources of symptoms (Deshpande et al., 2016). MRI is generally considered the next appropriate imaging study for chronic joint pain when x-rays are inconclusive or further investigation is warranted. CT may be appropriate in specific situations to provide additional bony detail for treatment planning or when MRI is contraindicated (Fox et al., 2018; Jawetz et al., 2022; Nacey et al., 2022).

Plain x-rays are typically sufficient for preoperative planning for the majority of patients undergoing joint replacement surgery. However, for those with congenital or significant atypical post-traumatic arthritic deformities, CT scan can be of value for further evaluation/planning (Shi et al., 2019). Advanced imaging will also be required prior to the replacement surgery if there will be the use of custom implants, patient specific instrumentation or computer assisted navigation (O'Connor & Kransdorf, 2013).

The American College of Radiology (ACR) Appropriateness Criteria for Chronic Extremity Joint Pain-Suspected Inflammatory Arthritis, Crystalline Arthritis, or Erosive Osteoarthritis (revised 2022) has recommended plain radiography as the initial imaging study for chronic extremity joint pain where crystalline arthritis is suspected (Subhas et al., 2022). X-ray sensitivity can be lower than other imaging modalities, however they may contain sufficient findings for the diagnosis of gout or calcium pyrophosphate deposition disease (CPPD). The benefits to using x-rays as an initial imaging study is to potentially avoid the need for further testing, treatment delays. Early onset gout/pseudogout may not be evident on any imaging, so reliance on a complete clinical history, evaluation and synovial fluid testing is important in any initial examination when gout/pseudogout is suspected (Richette et al., 2020).

Advanced imaging is typically not required for the evaluation of patients with suspected crystalline arthropathy. The presence of monosodium urate crystals or calcium

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pyrophosphate crystals on synovial fluid microscopy can be definitive of a diagnosis of gout. However, additional imaging can be helpful in the evaluation of an individual's symptoms when differential diagnoses are suspected (Richette et al., 2020).

Significant advances in imaging have made the visualization of gout/pseudogout much better than in previous years, especially when using US and CT technology. The 2018 EULAR recommendations stated that US offers the best potential for diagnosis of gout and dual-energy CT is showing great promise in its utility when compared to other imaging options (Richette et al., 2020). Research since those recommendations have added more support that US and dual-energy CT are modalities of choice. A small cross-sectional study demonstrated that US is more specific in detecting early stage gout and that both US and CT have similar accuracy for middle and late stage disease identification (Zhang et al., 2020). A systematic review in 2022 of 28 studies determined that the sensitivity and specificity for US to detect gout was 84% and 84% respectively for both early and late staged, and for dual-energy CT to be 89% and 91% for chronic gout (75% and 85% for earlier staged disease) (Shang et al., 2022). A 2019 meta-analysis found that dual-energy CT was only less sensitive for as early as 6 weeks since the start of symptoms (Gamala et al., 2019). In 2018, two systematic reviews analyzing the accuracy of and comparing dual energy CT other imaging modalities concluded it was better than x-ray or normal CT and equal to US in diagnosing gout (Ramon et al., 2018; Yu et al., 2018). There is limited evidence to lend any support of the utility of other advanced image options in the investigation of gout/pseudogout. The most recent ACR recommended that CT with contrast or MRI of any method are usually not appropriate when investigating gout/pseudogout (Subhas et al., 2022). The 2018 EULAR recommendations are similar, that while MRI has some ability to detect crystalline deposit there is limited research in the diagnostic utility of the images, especially when compared to other imaging options (Richette et al., 2020). The utility of MRI may change as research and technology continue to advance.

The ACR Appropriateness Criteria for Chronic Extremity Joint Pain-Suspected Inflammatory Arthritis, Crystalline Arthritis, or Erosive Osteoarthritis (revised 2022) recommended plain radiography as the initial imaging study for chronic extremity joint pain where Rheumatoid arthritis (RA) is suspect (Subhas et al., 2022). Clinical and laboratory assessment of RA remains the cornerstone of diagnosis and determining a response to treatment (Kgoebane et al., 2018). Inconclusive or non-diagnostic imaging results can be further evaluated with advanced imaging. MRI allows assessment of all structures as well as bone edema and baseline bone edema on low and high field MRI in patients with early RA is predictive of future radiographic damage (Cohen et al., 2011). Joints and bones in the hand are often affected in RA and assessing changes in these joints can help in therapy monitoring (Schleich et al., 2015). MRI and US play important roles in detecting subclinical disease in patients with inflammatory arthritis. These modalities have higher sensitivity in detecting subclinical synovitis, tenosynovitis, osteitis, and early erosive disease compared with physical exam and xray, therefore

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useful in early diagnosis and evaluating response to treatment (Terslev & Østergaard, 2021).

Investigation of Pigmented Villonodular Synovitis (PVNS) may be further aided with advanced imaging. Radiographs are non-specific and may appear normal 20% of the time but joint effusion, soft-tissue swelling, extrinsic erosion of bone, absence of calcification, preservation of joint space, and/or normal bone mineralization may be seen in diffuse intraarticular PVNS. Localized form my appear normal on plain radiographs (Murphey et al., 2008). MRI may be necessary for diagnosis (Gouin & Noailles, 2017). A retrospective review of 122 histologically confirmed PVNS cases demonstrated that MRI was helpful in obtaining a correct diagnosis 83% of the time (Ottaviani et al., 2011). MRI is also optimal for demonstrating the relationship of extraarticular lesions to the tendon sheath to suggest the diagnosis (Murphey et al., 2008).

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Capsular/Synovial and Meniscal Dysfunction (MS-29)

Guideline

Capsular/Synovial and Meniscal Dysfunction (MS-29.1)
Evidence Discussion (MS-29)
References (MS-29)

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Capsular/Synovial and Meniscal Dysfunction (MS-29.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning for capsular and/or synovial dysfunction. See specific details below regarding any requirements for conservative care prior to requesting advanced imaging.

- Initial plain x-ray imaging of the suspected area must first be performed after the current episode of symptoms started or changed and results available to the requesting provider.
- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed, **EXCEPT** as noted below

When the above criteria has been met, the following advanced imaging is considered medically necessary:

- **Shoulder**
  - Labral tear or dysfunction (e.g., SLAP, ALPSA, HAGL) – CT with contrast (CPT®73201), MRI without contrast (CPT®73221), or MRI with contrast (CPT®73222).
  - Adhesive capsulitis (frozen shoulder) – MRI without contrast (CPT®73221)
- **Hip**
  - Labral tear or dysfunction - CT with contrast (CPT® 73701), MRI without contrast (CPT® 73721), or MRI with contrast (CPT® 73722)
- **Knee**
  - Hemarthrosis, non-traumatic or spontaneous – MRI without contrast (CPT® 73721)
    - **trial of conservative care not required**
  - Hemarthrosis, traumatic – see specific section related to the tissue trauma (e.g., fracture, joint stability, ligament, osteochondral injury, etc)
  - Meniscus tear - MRI without contrast (CPT® 73721), or CT with contrast (CPT® 73701) if MRI cannot be performed, is considered medically necessary for further investigation of suspected meniscal tear when all of the following have been met:

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- Plain x-rays have been performed after the beginning of the current episode of symptoms started
- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed OR at least 2 of the following 4 criteria met:
  - positive McMurray's, Thessaly, or Apley's compression test
  - twisting or acute injury of the knee
  - locked knee: inability to fully extend knee on exam in comparison to the opposite knee
  - knee effusion
- For degenerative meniscal tear - MRI without contrast (CPT® 73721) is considered medically necessary for further investigation of suspected degenerative meniscus tear in an individual with osteoarthritis when all of the following have been met:
  - Plain x-rays have been performed after the beginning of the current episode of symptoms started
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed

◦ Synovial Plica or Medial Shelf – MRI without contrast (CPT® 73721)

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Advanced imaging of synovial joint symptoms is typically not recommended as an initial diagnostic study. Research has demonstrated that asymptomatic individuals may commonly have tears or other findings on advanced images of capsular and synovial tissues (e.g., labrum, capsule, synovial lining) (Schwartzberg et al., 2016; Vahedi et al., 2019). Abnormal findings could lead to a cascade of unnecessary treatment or even surgery as asymptomatic tissues typically do not require any treatment. The American College of Radiology (ACR) Appropriateness criteria recommended that plain x-ray is the initial imaging study for investigation of joint pain (Fox et al., 2018; Jawetz et al., 2023; Laur et al., 2025; Nacey et al., 2023). When initial x-rays are inconclusive or conservative care does not result in amelioration, more advanced images may be necessary.

Both CT and MRI technology, when necessary, may be useful for further investigation of labral tear at either the shoulder or hip. MR arthrography is considered the standard for labral imaging due to its high sensitivity and improved soft tissue contrast. However, there may be times, such as with acute trauma, effusion and pain, that MRI without contrast is preferred (Jawetz et al., 2023; Laur et al., 2025; Nacey et al., 2023). MRI without contrast can show if capsular thickening is present in the investigation of suspected adhesive capsulitis at the shoulder. It has a relatively high sensitivity for detection of adhesive capsulitis. The introduction of contrast fluid within the rotator interval or along the axillary recess can create limitations in detecting findings of adhesive capsulitis, for this reason MRA is not recommended as next imaging when investigating adhesive capsulitis (Nacey et al., 2023).

When additional investigation of knee pain is appropriate following initial x-rays and possible conservative care, MRI without contrast is the recommended next image for suspicion of capsular or synovial pathology. MRI has been demonstrated to show the presence of medial plica (Fox et al., 2018). Further evaluation of suspected hemarthrosis may involve the use of advanced imaging to help identify the cause of bleeding, especially in recurring cases (Sasho et al., 2008; van Vulpen et al., 2018).

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Foreign and Loose Bodies (MS-6)

Guideline

Foreign and Loose Bodies (MS-6.1)
Evidence Discussion (MS-6)
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Foreign and Loose Bodies (MS-6.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning.

Foreign Body

CT without contrast or MRI without contrast or MRI without and with contrast for further investigation of foreign bodies is considered medically necessary after plain x-rays have ruled out the presence of radiopaque foreign bodies as follows:

-
- CT without contrast is recommended when plain x-rays are negative and a radiopaque foreign body is still suspected
- MRI without and with contrast is an alternative to CT for assessing the extent of infection associated with a suspected foreign body

Loose Body

When the initial x-rays have been taken and the results are available to the provider, advanced imaging of symptomatic loose bodies in a joint is considered medically necessary as follows:

- **Shoulder** - MRI without contrast (CPT®73221)
- **Elbow** - CT without contrast (CPT® 73200) , CT with contrast (CPT® 73201), MRI without contrast (CPT® 73221) or MRI with contrast (CPT® 73222)
- **Hip** - MRI without contrast (CPT® 73721)
- **Knee** - MRI without contrast (CPT® 73721) or CT Knee with contrast (arthrogram) (CPT® 73701) if MRI cannot be performed
- **Ankle** - MRI without contrast (CPT® 73721)

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Evidence Discussion (MS-6)

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Initial x-rays are recommended as a first imaging examination following acute trauma or when evaluating infection of the musculoskeletal system and there is suspicion of foreign objects or loose bodies (Gorbachova et al., 2019; Pierce et al., 2022; Torabi et al., 2018). X-rays are highly sensitive to embedded radiopaque materials, especially metals. X-rays provide an excellent overview of the anatomic area of interest allowing for a better overall assessment of symptoms (Jarraya et al., 2014).

When a foreign body is not visualized on x-rays, ultrasound may be helpful to further evaluation (Gorbachova et al., 2019; Pierce et al., 2022; Torabi et al., 2018). Ultrasound has high sensitivity and specificity in detecting radiolucent objects like wood, and plastic. It has also been demonstrated as useful in detecting glass and metal (Alfuraih et al., 2022; Davis et al., 2015; Jarraya et al., 2014). Ultrasound is widely available, accessible, and does not involve ionizing radiation. Ultrasound can also help to evaluate complications of foreign body such as infections and vascular or tendon injuries. Ultrasound does have limitations, such as, visualization will be limited to more superficial tissue depths and variability of the technology available during the assessment may limit image quality (Alfuraih et al., 2022; Davis et al., 2015).

More advanced imaging may be necessary when suspected bodies are out of the range of ultrasound or are not clearly visualized on x-ray and ultrasound. CT has been shown as useful in detecting wood, aluminum, copper and some glass (Alfuraih et al., 2022). MRI is recommended when there is suspicion of infection or soft tissue and osseous change in relation to a foreign or loose body (Pierce et al., 2022. MRI is better than CT in the assessment of infection, however it was found to be less sensitive to actually visualizing a foreign body. There may also be image artifacts on an MRI if there are metallic foreign bodies (Alfuraih et al., 2022; Jarraya et al., 2014).

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Fractures (MS-5)

Guideline

Acute Fractures (MS-5.1)
Occult, Stress, Insufficiency Fracture or Reaction (MS-5.2)
Other Indications (e.g., Delayed Union, Preoperative) (MS-5.3)
Evidence Discussion (MS-5)
References (MS-5)

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Acute Fractures (MS-5.1)

MS.FX.0005.1
v1.0.2027

Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning.

CT without contrast of the area of interest is considered medically necessary for an acute complex fracture when the initial plain x-ray findings demonstrate a complex (comminuted, displaced, or intra-articular) fracture with or without dislocation.

MRI without or MRI without and with contrast of the area of interest is considered medically necessary for an acute complex fracture when the initial plain x-ray findings demonstrate a complex (comminuted, displaced or intraarticular) fracture and there is known or suspected association of the fracture with neoplastic disease or there is a contraindication to CT.

For known or suspected Lisfranc (tarsometatarsal) fracture (with or without dislocation), CT or MRI without contrast of the foot is considered medically necessary for further investigation when the following apply:

- Initial plain x-rays have been obtained and results are available to the ordering provider
- For known or suspected Lisfranc dislocation, or ligament injury (without fracture) see: J**oint Instability and Dysfunction (MS-30.1)** for dislocation or **Ligament and Fascia Injury (MS-31.1)** for ligament injury

For osteochondral fracture or osteochondral injury, see: **Osteochondral Lesions and Fractures (MS-13.1)**

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Occult, Stress, Insufficiency Fracture or Reaction (MS-5.2)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. See specific details below regarding any requirements for conservative care prior to requesting advanced imaging.

MRI without contrast is considered medically necessary for suspected **hip/femoral neck, tibia, pelvis/sacrum, tarsal navicular, proximal fifth metatarsal, or scaphoid** occult/stress/insufficiency fractures, and suspected **atypical femoral shaft** fractures **related to bisphosphonate use** when ALL of the following apply:

- The initial evaluation, history, and physical exam fails to establish a definitive diagnosis AND
- The initial plain x-ray findings are negative or equivocal
- CT without contrast can be performed as an alternative to MRI for suspected occult/insufficiency fractures of the pelvis/hip and suspected atypical femoral shaft fractures related to bisphosphonate and suspected occult fractures of the scaphoid

CT or MRI without contrast of the area is considered medically necessary for the investigation of all other suspected occult/stress/insufficiency fractures when ANY of the following apply, except as otherwise noted:

- Initial plain x-rays obtained a minimum of 14 days after the onset of symptoms are non-diagnostic for fracture OR
- Repeat plain x-rays remain non-diagnostic for fracture after a minimum of 10 days of provider-directed conservative treatment
- **For Tarsal navicular stress/occult fracture** - MRI Foot without contrast (CPT® 73718)
  - CT Foot without contrast (CPT® 73700) for follow-up of healing fractures
  - X-ray results are available to the requesting provider
- **Note** - When MRI cannot be performed to investigate suspected fractures see: **Nuclear Medicine (MS-28.1)**

MRI without contrast (CPT® 73718) is considered medically necessary for suspicion of shin splints when both of the following are met:

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- Initial plain x-ray results are available to the requesting provider AND
- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed

For **stress fracture follow-up** imaging for "return to play" evaluation at least 3 months after the initial imaging study, MRI without contrast of the area of interest is considered medically necessary

For **stress reaction surveillance** or "return to play" decisions, advanced imaging is not considered medically necessary regarding a stress reaction identified on an initial imaging study.

Periprosthetic fractures related to joint replacement see: **Joint Replacement Post-Operative Follow-Up (MS-16.1)**

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Other Indications (e.g., Delayed Union, Preoperative) (MS-5.3)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning.

CT or MRI without contrast after recent (within 30 days) plain x-ray is considered medically necessary if ONE of the following is present:

- Concern for delayed union or non-union of fracture, osteotomy, or joint fusions
- Part of preoperative evaluation for a planned surgery of a complex fracture with or without dislocation

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Evidence Discussion (MS-5)

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It is widely accepted that the initial imaging for a patient with a suspected fracture should be plain radiographs. The American College of Radiology (ACR) has recommended plain x-ray as the initial image for a majority of both acute and chronic musculoskeletal pain situations, including suspected fractures (American College of Radiology, n.d.). When the initial x-rays are negative or unclear, yet fracture is still suspected, the ACR has recommended CT as the next method of investigation as it can provide detailed information on bony structure and allow for further evaluation and treatment planning (American College of Radiology, n.d.). MRI may be an alternative image to CT in a situation where CT is contraindicated or there has been complex and/or extensive trauma and surrounding tissues also need to be evaluated (Bartolotta et al., 2024; Laur et al., 2024; Taljanovic et al., 2019).

The American College of Radiology also recommended that x-rays should be the initial imaging for a suspected stress fracture. Initial x-rays may not identify the fracture, and if there is continued suspicion, repeat x-ray imaging in 10-14 days is supported (Morrison et al., 2024). Repeat radiographs may show osseous reaction confirming the presence of an occult or stress fracture. However, if repeat x-rays remain negative and there is still suspicion of an occult or stress fracture, MRI is recommended as it has been shown to be the most sensitive and specific imaging modality for workup of suspected stress injuries (Morrison et al., 2024; Wright et al., 2016). In addition, there exists a subset of occult/stress/insufficiency fractures that have an increased risk of fracture progression, delayed healing, non-union and avascular necrosis. For these high-risk injuries, advanced imaging is recommended if initial x-rays are negative or indeterminate as these injuries require early diagnosis and immediate treatment (Blood et al., 2015; McInnis & Ramey, 2016; Morrison et al., 2024).

The evaluation of patients with chronic stress syndromes (e.g., shin splints) includes a detailed history, physical examination, and plain x-rays (Morrison et al., 2024). Many individuals can improve with conservative care. If the individual fails to respond to an adequate trial of conservative care, MRI is recommended as the next imaging option for further investigation (Galbraith & Lavallee, 2009).

For the assessment of bony healing, serial x-ray imaging is usually sufficient. However, if there are still concerns for delayed union or non-union, CT scanning can provide detail as to the presence or absence of bridging callus. MRI can also assist in the evaluation of bone healing.

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Infection (MS-9)

Guideline

General Infection/Osteomyelitis (MS-9.1)
Charcot and Septic Joint (MS-9.2)
Evidence Discussion (MS-9)
References (MS-9)

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General Infection/Osteomyelitis (MS-9.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning.

MRI without contrast, MRI without and with contrast, CT without contrast, or CT with contrast of the affected area for further investigation of infection is considered medically necessary after plain x-ray(s) have been obtained in the following scenarios:

- Plain x-ray(s) do not demonstrate infection, AND
- Plain x-ray(s) do not suggest alternative diagnoses such as neuropathic arthropathy (see **Charcot Joint (MS-9.2)**) or fracture, AND
- Soft tissue or bone infection (osteomyelitis) is suspected

OR

- Plain x-ray(s) are positive for infection, AND
- The extent of infection into the soft tissues and any skip lesions require evaluation

For individuals with **diabetic foot infections** after plain x-rays - as a compliment to plain x-ray - MRI without and with contrast (CPT® 73720), MRI without contrast (CPT® 73718), CT without contrast (CPT® 73700) or CT with contrast (CPT® 73701)

For individuals with suspected spinal infections please use the spine imaging guidelines, see: **Red Flag Indications (SP-1.2)**

For nuclear medicine studies appropriate in specific scenarios, see: **Nuclear Medicine (MS-28)**

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Charcot and Septic Joint (MS-9.2)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. See specific details below regarding any requirements for conservative care prior to requesting advanced imaging.

Charcot Joint

Following the initial x-ray and the documented failure of the required 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed, the following advanced imaging is considered medically necessary for the investigation of suspected Charcot joint:

- Charcot ankle - MRI without contrast (CPT® 73721)
- Charcot foot - MRI without contrast (CPT® 73718) or MRI without and with contrast (CPT® 73720)

Septic Joint

MRI without and with contrast, MRI without contrast, CT without contrast, CT with contrast, or Ultrasound (CPT® 76881 or CPT® 76882) of the affected joint for further investigation of joint sepsis is considered medically necessary when **standard or image-guided arthrocentesis is contraindicated, unsuccessful, or non-diagnostic**, and the clinical documentation satisfies ALL of the following criteria:

- History and physical examination findings [One of the following]:
  - Development of an acutely hot and swollen joint (<2 weeks)
  - Decreased range of motion due to pain
  - Documented fever
- Laboratory tests [One of the following]:
  - Leukocytosis
  - Elevated ESR or C-reactive protein
  - Analysis of the joint fluid is non-diagnostic
- Plain x-ray of the joint - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider

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MRI without and with contrast, MRI without contrast, CT without contrast, or CT with contrast of the affected joint to evaluate the extent of infection into the soft tissues and any skip lesions that would require evaluation is considered medically necessary after plain x-rays if **the arthrocentesis is diagnostic and if there is a confirmed septic joint.** Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider.

For the criteria for further investigation of post-operative joint replacement septic infection please see joint specific criteria in **Joint Replacement Post-Operative Follow-Up (MS-16.1)**

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Evidence Discussion (MS-9)

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The American College of Radiology (ACR) has recommended that x-rays should be used for the initial evaluation of musculoskeletal infections, including osteomyelitis, septic arthritis, and soft tissue infection (Pierce et al., 2022). They also recommended x-rays as the initial image for the evaluation of feet in individuals with Diabetes Mellitus, which often present with symptoms consistent with infection (Baker et al., 2025). Initial radiographs can provide an excellent overview of the anatomic area of interest and can help to exclude other causes of swelling or pain (Benito et al., 2024). Radiographs can help with the interpretation of future imaging studies such as CT, MRI, US, and nuclear medicine scans.

The clinical presentation of a suspected infected area or joint has a wide differential diagnosis. Infection is primarily a clinical diagnosis based on physical examination and laboratory testing of blood and/or synovial fluid, which may require prompt arthrocentesis and culture (Benito et al., 2024; Chan et al., 2020; Ravn et al., 2023). In select situations when a full examination and initial imaging is unclear, advanced imaging may be necessary to better visual the extent of suspected infection and associated effusion or other tissue damage or injury (Benito et al., 2024; Ravn et al., 2023).

US, MRI, or CT can be appropriate as the next imaging study for suspected septic arthritis, soft tissue infection, or osteomyelitis following normal radiographs (Baker et al., 2025; Pierce et al., 2022). MRI is often the next image of choice for suspect musculoskeletal infection due to its superior contrast resolution of soft tissues which can be helpful in detecting the spread of infection (Benito et al., 2024; Ravn et al., 2023; Simpfendorfer, 2017). They may also be helpful to evaluate the adjacent soft tissues for infection. MRI is also recommended as the next image for evaluation of suspected Charcot joint of the foot. Charcot joints often present with complex symptoms including infection and potential ulceration that may be best visualized with MRI (Baker et al., 2025). US can be helpful in detecting effusion and for guiding aspiration for more superficial areas in question (Benito et al., 2024; Porrino et al., 2019). CT may also be appropriate in situations when MRI is contraindicated, such as in areas with implanted metal or suspected foreign metal, or MRI is unavailable (Benito et al., 2024; Ravn et al., 2023).

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Joint Instability and Dysfunction (MS-30)

Guideline

Joint Instability and Dysfunction (MS-30.1)
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Joint Instability and Dysfunction (MS-30.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required, **EXCEPT** for situations specifically listed as not required in this section, prior to requesting advanced imaging for further investigation and/or treatment planning. See specific details throughout the section regarding any requirements for when conservative care prior to requesting advanced imaging is required.

- Initial x-rays must have been performed after the current episode of symptoms started or changed and the results are available to the requesting provider

Advanced imaging for further investigation of joint instability and/or articular dysfunction is considered medically necessary as follows:

- **Shoulder**:
  - Glenohumeral dislocation/subluxation and/or Bankart or Hill-Sachs lesion – MRI with contrast (CPT®73222), MRI without contrast (CPT®73221), CT with contrast (CPT®73201) or CT without contrast (CPT®73200)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required in individuals over age 40 with a first time dislocation
    - Conservative treatment is not required for individuals 40 years of age or younger with a first-time dislocation, and individuals with recurrent dislocations
  - Acromioclavicular dislocation/separation when ruling out possible rotator cuff tear – MRI without contrast (CPT® 73221)
  - Sternoclavicular (SC) dislocation/separation
    - **Initial x-rays are not required**
    - For evident or suspected SC dislocations - CT chest without contrast (CPT® 71250) or CT chest with contrast (CPT® 71260)
    - For differentiating physeal injury from SC dislocation in individuals 25 years of age or younger OR planning for operative repair - MRI chest without contrast (CPT® 71550) or MRI without and with contrast (CPT® 71552)

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    - Proximal 1/3rd (one-third) clavicle fracture – CT chest with contrast (CPT® 71260), CT chest without contrast (CPT® 71250), MRI chest without contrast or MRI chest without and with contrast (CPT® 71552)
- **Wrist**:
    - Distal Radioulnar joint instability – CT of both wrists, pronated and supinated positions, without contrast (CPT® 73200)
- **Pelvis**:
    - Osteitis Pubis/ Symphysis Pubis Diastasis – MRI without contrast (CPT® 72195)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Hip**:
    - Femoroacetabular Impingement, for preoperative planning – MRI without contrast (CPT® 73721) or MRI with contrast (CPT® 73722) and CT without contrast (CPT® 73700) or CT Pelvis without contrast (CPT® 72192)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Knee**:
    - Tibiofemoral dislocation following a significant trauma to evaluate for ligament and vascular injury – MRI without contrast (CPT® 73721) and/either MRA lower extremity without and with contrast (CPT® 73725) or CTA lower extremity without and with contrast (CPT® 73706)
    - Patellar dislocation/subluxation following an acute injury with consideration of surgery and concern for osteochondral fragment – MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
    - Recurrent Patellar instability if consideration for surgery – MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Ankle**:
    - Impingement, anterior, anterior-lateral or posterior – MRI without contrast (CPT® 73721), MRI with contrast (CPT® 73722), or CT with contrast (CPT® 73701)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

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- Instability, preoperative planning – MRI without contrast (CPT® 73721) or MRI with contrast (CPT® 73722)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

- **Foot**:
  - Lisfranc (tarsometatarsal) dislocation, known or suspected - MRI Foot without contrast (CPT® 73718) or CT Foot without contrast (CPT® 73700)
    - For known or suspected Lisfranc ligament injury or fracture (with or without dislocation) see: **Ligament and Fascia Injury (MS-31.1)** for ligament injury or **Acute Fracture (MS-5.1)** for fracture
  - Tarsal Coalition, preoperative planning – MRI Ankle without contrast (CPT® 73721) or CT Ankle without contrast (CPT® 73700)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Sinus Tarsi Syndrome, if diagnosis is unclear or for preoperative evaluation – MRI Ankle without contrast (CPT® 73721)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

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Evidence Discussion (MS-30)

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The American College of Radiology (ACR) has recommended that x-rays be the initial image of choice for evaluation of acute and chronic joint instability symptoms (e.g., dislocation, subluxation) and articular dysfunction or abnormality (e.g., bony impingement, coalition) (Chang et al., 2018; Gorbachova et al., 2020; Jawetz et al., 2023; Laur et al., 2025; Smith et al., 2020; Torabi et al., 2019). X-rays, along with a full history and clinical examination, may be sufficient to determine a diagnosis and treatment plan. In many instances, having an individual follow a course of provider-directed conservative care may be sufficient to reduce symptoms and aid in the return of normal function (Chona et al., 2022; Lowry et al., 2024). Early advanced imaging could expose individuals to unnecessary risks and additional healthcare costs.

Some acute injuries involving significant trauma may require advanced imaging prior to conservative care. Damage to surrounding anatomy can occur that would need prompt treatment. MRI is typically recommended as the next image for many acute joint injuries as it has excellent capability in discriminating soft tissues and surrounding anatomy. CT may also be appropriate when MRI is contraindicated, unavailable or better visualization of bony alignment is required, such as in surgical planning (Gorbachova et al., 2020; Laur et al., 2025; Smith et al., 2020; Taljanovic et al., 2020; Torabi et al., 2019).

When conservative care has not been effective at improving function, or an individual presents with re-occurring and chronic problems, both MRI and CT are recommended as next images to further investigate joint instability and dysfunction (Chang et al., 2018; Jawetz et al., 2023; Lowry et al., 2024; Schmaranzer et al., 2021). MRI is recommended as useful in assessing the integrity of tissues that support the joint (e.g., labrum, capsule, ligament) and damage that may have occurred over time to chondral surfaces of both the hip and shoulder (Lowry et al., 2024; Schmaranzer et al., 2021). MRI was shown to have good inter- and intra-rater reliability in assessing patellofemoral instability (Geraghty et al., 2022).

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Ligament and Fascia Injury (MS-31)

Guideline

Ligament and Fascia Injury (MS-31.1)
Evidence Discussion (MS-31)
References (MS-31)

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Ligament and Fascia Injury (MS-31.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. See specific details throughout the section regarding any requirements for when conservative care prior to requesting advanced imaging is required.

- Initial plain x-ray imaging of the suspected area must first be performed after the current episode of symptoms started or changed with results available to the requesting provider

Advanced imaging for further investigation of ligament and fascia injury is considered medically necessary as follows:

- **Elbow**
  - Ulnar Collateral Ligament tear, following acute or repetitive trauma (including overhead throwing athletes) – MRI without contrast (CPT® 73221), MRI with contrast (CPT® 73222) or CT with contrast (CPT® 73201)
- **Wrist**
  - Intrinsic ligament tear and/or Triangular Fibrocartilage Complex injury – MRI with contrast (CPT® 73222) or CT with contrast (CPT® 73201).
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Hand**
  - Ulnar Collateral Ligament tear, if ruling out a Stener lesion or a complete ligament tear – MRI without contrast (CPT® 73218)
- **Knee**
  - Cruciate and/or collateral ligament tear – MRI without contrast (CPT® 73721)
    - A failed trial of conservative treatment is not required if any of the following signs are positive in comparison to the opposite knee:
      - Anterior Drawer
      - Lachman
      - Pivot Shift

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- Posterior Drawer or Posterior Sag
- Valgus Stress
- Varus Stress

▪ Otherwise, the documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms started is required

◦ Patellofemoral and Patellotibial ligament tear – MRI without contrast (CPT® 73721)

▪ A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

- **Ankle**

◦ Lateral/Medial Ligament injury (e.g., sprained ankle), including avulsion fracture – MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)

▪ A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

◦ Syndesmosis Injury (e.g., high ankle sprain) – MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)

- **Foot**

◦ Lisfranc (tarsometatarsal) ligament injury, known or suspected - MRI Foot without contrast (CPT® 73718) or CT Foot without contrast (CPT® 73700)

▪ For known or suspected Lisfranc dislocation injury or fracture (with or without dislocation) see: **Joint Instability and Dysfunction (MS-30.1)** for dislocation or **Acute Fracture (MS-5.1)** for fracture.

◦ Plantar Fascia

▪ Fascia tear (partial or complete) – MRI without contrast (CPT® 73718)

- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

▪ Fasciitis preoperative planning – MRI without contrast (CPT® 73718)

- A documented failure of provider-directed conservative treatment lasting at least 6 months or more, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

▪ Plantar plate (e.g., Turf Toe injury) – MRI without contrast (CPT® 73718)

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- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

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Evidence Discussion (MS-31)

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Initial imaging of MSK injuries where ligament or fascia is suspected to be involved is typically done with plain x-rays. The American College of Radiology has recommended x-ray as the initial image for evaluation of most acute injuries (American College of Radiology, n.d.). Even in suspected ligament or fascia injury, initial x-rays can be beneficial in determining if there is damage or malalignment to bone that needs to be considered during a thorough evaluation.

A trial of conservative care following negative x-rays may be beneficial for some suspected ligament and fascia injuries prior to immediately seeking advanced imaging. Individuals that show improvement over time with conservative care could avoid the additional potential exposure and expense of advanced imaging or unnecessary treatment or surgery. In their 2018 revised Appropriateness Criteria for Acute Hand and Wrist Trauma, the ACR recommended that symptomatic individuals with negative initial x-rays may use a trial of immobilization and repeat x-rays (Torabi et al., 2019). Current injury rehabilitation guidelines have recommended that individuals with suspected lateral ankle sprains follow a 4-6 week conservative care program with advanced imaging only being performed for those with persistent symptoms despite following the whole program (Martin et al., 2021). Furthermore, guidelines also indicate that individuals with suspected plantar fascial pain usually do not require imaging studies unless they fail a comprehensive conservative care program (Koc et al., 2023).

When medically necessary, advanced imaging for ligament and fascia injury has demonstrated high accuracy. When further imaging beyond initial x-ray or ultrasound is necessary to investigate potential ligament or fascia injury, MRI is typically considered the standard next image option. ACR recommendations for imaging of the acute elbow, wrist, hand, knee, ankle and chronic foot all support MRI as the next imaging type for ligament or fascia investigation. Due to MRI's sensitivity to different tissues, it can be useful in evaluating not only ligament and fascia, but also any associated stress injury to bone or marrow, edema patterns, syndesmotic injury, meniscal involvement or other soft tissue injury (Campbell et al., 2020; Chen et al., 2024; Qamhawi et al., 2021; Smith et al., 2020; Tafur et al., 2020; Taljanovic et al., 2020; Torabi et al., 2019). Having accurate imaging of all aspects of any injury will aid in appropriate management and treatment planning.

CT imaging may also be useful in some instances, such as if MRI is contraindicated for an individual or when evaluation of bone displacement is desired. When combined with contrast, CT can be helpful in more accurate visualization of malalignment of the small and compact joints of the wrist. CT arthrography has demonstrated sensitivity and specificity equal to, or higher than, MRI or arthroscopy in detection of scapholunate and

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lunotriquetral ligament injury (Torabi et al., 2019). CT imaging is supported in suspected "high-ankle" syndesmotic injury, while MRI is often still considered a better option, measurements from CT scans and displayed displacement have been demonstrated to identify syndesmotic injury seen on MRI (Tafur et al., 2020).

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Limb Length Discrepancy (MS-17)

Guideline

Limb Length Discrepancy (MS-17.1)
Evidence Discussion (MS-17)
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Limb Length Discrepancy (MS-17.1)

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Criteria

A diagnostic advanced imaging CPT code (e.g., CPT® 73700, CPT® 73701, or CPT® 73702) is considered not medically necessary for the evaluation of limb length discrepancy.

Either plain radiograph or "CT scanogram," both reported with CPT® 77073, is considered medically necessary to radiographically evaluate limb length discrepancy due to congenital anomalies, acquired deformities, growth plate (physeal injuries or surgery), or inborn errors of metabolism.

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Evidence Discussion (MS-17)

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The findings of recent systematic reviews support that x-ray is the most valid and reliable method for evaluation of limb length discrepancy. Advanced imaging modalities are not supported in current research as a method to evaluate leg length discrepancy. These technologies are more expensive, can have added risks such as sedation, and increased exposure to radiation. Furthermore, they can have added time it takes an individual to access the technology and may be contraindicated for some that have implantable devices. Full length, anterior-to-posterior x-ray images are recommended. Studies also reported excellent reliability using CT scanogram imaging, which may be an appropriate alternative to x-rays (Alfuth et al., 2021; Pettit et al., 2022).

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Muscle/Tendon Unit Injuries/Diseases (MS-11)

Guideline

Muscle and Tendon Injuries (MS-11.1)
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Muscle and Tendon Injuries (MS-11.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. See specific details throughout the section regarding any requirements for when conservative care is required prior to requesting advanced imaging.

- Initial plain x-ray of the suspected area must first be obtained after the current episode of symptoms started or changed and results are available to the provider

Muscle belly strains/tears - Advanced imaging is considered not medically necessary. Advanced imaging will not change the treatment plan for muscle belly strains/tears. There is lack of evidence to support surgical treatment for these injuries. These injuries are nearly always treated through conservative, non-operative care.

Tendons - Advanced imaging for further investigation of tendon injury and/or pathology is considered medically necessary as follows:

- MRI without contrast for imaging tendons not located in specific joints outlined below is medically necessary when either of the following apply:
  - Suspected partial tendon tear of a specific named tendon
  - Complete tendon tear of a specific named tendon for preoperative planning
- **Shoulder**
  - Impingement – MRI without contrast (CPT®73221) or MRI with contrast (CPT®73222) or CT with contrast (CPT® 73201) if MRI is contraindicated
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Chronic tendon inflammation/irritation (e.g., tendinitis, bursitis) – MRI without contrast (CPT®73221)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Bicep Tendon (Long Head), complete tear – MRI without contrast (CPT®73221)
    - Clinical exam must be inconclusive, or advanced imaging for preoperative planning/surgery is being considered

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- Pectoralis Major/Minor complete tear – MRI without contrast (CPT®73221) or MRI Chest without contrast (CPT®71550)
  - Clinical exam must be inconclusive or for preoperative planning
- Rotator Cuff tendon tear
  - Partial or complete tear from acute injury and surgery is being considered – MRI without contrast (CPT®73221), MRI with contrast (CPT®73222) or CT with contrast (CPT®73201)
  - Partial or complete tear – MRI without contrast (CPT®73221) or MRI with contrast (CPT®73222) or CT with contrast (CPT®73201) if MRI is contraindicated
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- Other tendon injury or pathology not otherwise specified above, partial or complete tear – MRI without contrast (CPT®73221)
  - Specific tendon must be named for partial tendon tear
  - Complete tears must be in relation to preoperative planning of a specific named tendon

- **Elbow**
  - Chronic tendon inflammation/irritation (e.g., tendinitis, bursitis)
    - Bursitis – MRI without contrast (CPT® 73221) or MRI without and with contrast (CPT® 73223)
      - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
    - Tendinitis – MRI without contrast (CPT® 73221)
      - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
    - Epicondylitis, medial or lateral – MRI without contrast (CPT® 73221)
      - Symptoms must persist for longer than 6 months despite trial of at least 6 weeks of conservative treatment. A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Bicep/Tricep insertion tendon, complete tear – MRI without contrast (CPT® 73221)

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        - Clinical examination must be inconclusive or imaging is for preoperative planning
    - Other tendon injury or pathology not otherwise specified above, partial or complete tear – MRI without contrast (CPT® 73221)
        - Specific tendon must be named for partial tendon tear
        - Complete tears must be in relation to preoperative planning of a specific named tendon
- **Wrist and Hand**
    - Chronic tendon inflammation/irritation (e.g., tendinitis) – MRI without contrast (CPT® 73221 for wrist or CPT® 73218 for hand) or MRI without and with contrast (CPT® 73223 for wrist or CPT® 73220 for hand)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
    - Other tendon injury or pathology not otherwise specified above, partial or complete tear – MRI without contrast (CPT® 73221 for wrist or CPT® 73218 for hand) or MRI without and with contrast (CPT® 73223 for wrist or CPT® 73220 for hand)
        - Specific tendon must be named for partial tendon tear
        - Complete tears must be in relation to preoperative planning of a specific named tendon
- **Pelvis**
    - Chronic tendon inflammation/irritation (e.g., tendinitis) – MRI without contrast (CPT® 72195) or MRI right and or left hip without contrast (CPT® 73721)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
    - Tendon tear, partial or complete – MRI without contrast (CPT® 72195)
        - Specific tendon must be named
    - Athletic Pubalgia (Sports Hernia) - MRI without contrast (CPT® 72195)
        - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
    - Piriformis Syndrome – This condition is imaged according to the criteria found in the Peripheral Nerve and Neuromuscular Guidelines see: **Focal Neurophathy (PN-2.1)**
- **Hip**

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- Chronic tendon inflammation/irritation (e.g., tendinitis, bursitis) – MRI without contrast (CPT® 73721)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- Abductor tear/avulsion – MRI without contrast (CPT® 73721)
- Other tendon injury or pathology not otherwise specified above, partial or complete tear – MRI without contrast (CPT® 73721)
  - Specific tendon must be named for partial tendon tear
  - Complete tears must be in relation to preoperative planning of a specific named tendon
- Piriformis Syndrome – See above in **Pelvis**

- **Knee**
  - Chronic tendon inflammation/irritation (e.g., tendinitis) – MRI without contrast (CPT® 73721)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Quadriceps tendon (distal) complete tear, preoperative planning – MRI without contrast (CPT® 73721)
  - Other tendon injury or pathology not otherwise specified above, partial or complete tear – MRI without contrast (CPT® 73721)
    - Specific tendon must be named for partial tendon tear
    - Complete tears must be in relation to preoperative planning of a specific named tendon
- **Ankle**
  - Chronic tendon inflammation/irritation (e.g., posterior tibial tendinitis/tendinosis, peroneal tendon tendinitis/tendinosis, Achilles tendinitis/tendinosis) – MRI without contrast (CPT® 73721)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Peroneal tendon instability (dislocation or subluxation)
    - For acute dislocation or subluxation when surgery is being considered, MRI without contrast (CPT® 73721)
    - For chronic instability, MRI without contrast (CPT® 73721)

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- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

- Achilles Tendon, complete tear, preoperative planning – MRI without contrast (CPT® 73721)
- Other tendon injury or pathology not otherwise specified above, partial or complete tear – MRI without contrast (CPT® 73721)
  - Specific tendon must be named for partial tendon tear
  - Complete tears must be in relation to preoperative planning of a specific named tendon

- **Foot**
  - Chronic tendon inflammation/irritation (e.g., tendinitis) – MRI without contrast (CPT® 73718)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Tendons, partial or complete tear – MRI without contrast (CPT® 73718)
    - Specific tendon must be named for partial tendon tear
    - Complete tears must be in relation to preoperative planning of a specific named tendon

For **inflammatory muscle disease imaging**, please see either: **Muscle Diseases (PN-8.5)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines or **Inflammatory Muscle Diseases (PEDMS-10.3)** in the Pediatric Musculoskeletal Imaging Guidelines.

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Compartment Syndrome (MS-11.2)

MS.MI.0011.2
v1.0.2027

Criteria

Acute - This is a surgical emergency and advanced imaging is considered not medically necessary as this diagnosis is made clinically by direct measurement of muscle compartment pressure.

Chronic/Exertional - Advanced imaging should only be considered when ruling out other potential causes of extremity pain following a plain x-ray and conservative treatment as indicated. Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider.

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Evidence Discussion (MS-11)

MS.MI.0011.0
v1.0.2027

Initial evaluation of a patient with a suspected tendon injury should include an accurate history, careful examination and plain radiographs. The American College of Radiology has recommended x-ray as the initial image for evaluation of most acute and chronic injuries (American College of Radiology, n.d.). With negative x-rays, suspicion of tendon injury does not always require immediate advanced imaging. Best practice recommendations for MSK pain have stated that imaging be used selectively. Unnecessary imaging can drive up costs of care and may lead to over-medicalization of an individual's symptoms (Desmeules et al., 2025; Lin et al., 2020). Many muscle and tendon injuries can significantly improve through conservative care without advanced imaging.

After x-rays have been done, and any conservative care recommended has not resulted in a meaningful improvement of symptoms, advanced imaging may be beneficial for further assessment and treatment planning of certain muscle and tendon injuries. MRI is supported by the American College of Radiology as a next appropriate image in the evaluation of acute and chronic shoulder, elbow, wrist, hip, knee, ankle and foot injuries when initial x-rays are negative or unclear and muscle or tendon involvement is suspected (Bartolotta et al., 2024; Chang et al., 2017; Chen et al., 2024; Fox et al., 2018; Jawetz et al., 2022; Laur et al., 2024; Lugo-Pico et al., 2020; Nacey et al., 2022; Stensby et al., 2023; Taljanovic et al., 2019; Thomas et al., 2022; Torabi et al., 2018; van Dijk et al., 2016). Evidence has shown that MRI has been validated as an excellent method to evaluate the integrity of muscle and tendon, especially for instances of surgical planning, differential diagnosis or assessment of injury too deep for clear visualization by US (Bordalo et al., 2023; Courage et al., 2023).

Advanced imaging will typically not change the treatment plan for muscle belly strains/tears. These injuries are most often treated through conservative, non-operative, care. There is limited evidence to support the surgical repair of muscle belly strains/tears (Ramos et al., 2015).

Initial diagnosis of compartment syndrome is typically based on clinical presentation, perfusion pressure measurements and laboratory results. Acute compartment syndrome is considered a medical emergency for which a thorough clinical assessment and direct pressure measurements of the compartment can result in a diagnosis so the individual can quickly receive emergency care. Advanced imaging does not play a role in the diagnosis or management of this condition and may delay the time to surgical treatment (Osborn & Schmidt, 2021; Sellei et al., 2020). Chronic exertional compartment syndrome can be determined through dynamic intra-compartmental pressure measurements. These are considered gold standard for diagnosis of chronic

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compartment pressure concerns. MRI has lacked validity as a non-invasive diagnostic tool for this condition. However, MRI may be useful to rule out other possible sources of pain if plain x-rays fail to find a source (Osborn & Schmidt, 2021; van der Kraats et al., 2023).

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Chondral/Osteochondral Lesions (MS-13)

Guideline

Osteochondral Lesions and Fractures (MS-13.1)
Evidence Discussion (MS-13)
References (MS-13)

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Osteochondral Lesions and Fractures (MS-13.1)

MS.OC.0013.1
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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. The following must be met prior to requesting advanced imaging for further investigation and/or treatment planning of suspected osteochondral lesions or fractures (including osteochondritis dissecans):

- Initial plain x-ray imaging of the suspected area must first be performed after the current episode of symptoms started or changed
- If plain x-rays show a non-displaced osteochondral fragment, follow-up imaging should be with plain x-rays. Advanced imaging is not medically necessary

When the initial x-rays are negative and an osteochondral injury is still suspected or the x-rays and clinical examination suggest an unstable osteochondral injury, the following advanced imaging is considered medically necessary:

- **Elbow** - MRI without contrast (CPT® 73221), MRI with contrast (CPT® 73222), CT without contrast (CPT® 73200) or CT with contrast (CPT® 73201)
- **Knee** MRI without contrast (CPT® 73721), MRI with contrast (CPT® 73722), or CT with contrast (CPT® 73701)
- **Ankle** - MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
- **Other Joints** - MRI without contrast, MRI with contrast (arthrogram), or CT with contrast (arthrogram)
- **Follow-up of healing (including post-operative fixation)** - MRI without contrast or CT without contrast when healing cannot be adequately assessed on follow-up plain x-rays.

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Evidence Discussion (MS-13)

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The American College of Radiography (ACR) has recommended that x-ray should be the first imaging test performed to evaluate joint pain suspected to be due to chondral/ osteochondral lesions (Chang et al., 2018; Fox et al., 2018; Thomas et al., 2022). Open physes have a much higher potential for healing with conservative treatment. So, radiographs may help to exclude other causes of pain and to determine skeletal maturity, which significantly affects prognosis and management of Osteochondritis Dissecans lesions (OCD). Radiographs may also be sufficient for classification of lower grade lesions avoiding unnecessary advanced imaging (Andriolo et al., 2022). In clinical practice, serial radiographs may be sufficient for monitoring healing of juvenile OCD lesions.

In individuals with radiographs positive for Osteochondritis Dissecans (OCD) or subchondral insufficiency fracture, or with negative radiographs but osteochondral fracture is still suspected, MRI may be medically necessary to further evaluate cartilage for additional injuries and for grading of osteochondral fractures and OCD (Chang et al., 2018; Fox et al., 2018; Thomas et al., 2022). MRI has a high diagnostic value for assessing the stability of lesions, especially in higher grade lesions (Andriolo et al., 2022; Hu et al., 2019). This makes MRI useful in determining the best method of treatment, be that conservative or surgical (Andriolo et al., 2022; Nammour et al., 2024). Repeat MRI is suggested only if radiographs are not diagnostic for healing and for worsening symptoms (Nammour et al., 2024). CT without contrast may be medically necessary to evaluate patients with OCD to confirm loose bodies or when MRI is not definitive (Chang et al., 2018; Fox et al., 2018; Thomas et al., 2022). MR arthrography or CT arthrography is an effective test for locating intra-articular osteochondral fragments, loose bodies and grading chondral and osteochondral lesions. A combination of x-rays and MRI or CT is recommended to best evaluate the stability of lesions (Pu et al., 2021).

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Osteonecrosis/Avascular Necrosis (MS-4)

Guideline

Osteonecrosis/Avascular Necrosis (MS-4.1)
Evidence Discussion (MS-4)
References (MS-4)

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Osteonecrosis/Avascular Necrosis (MS-4.1)

MS.AN.0004.1
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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. The following must be met prior to requesting advanced imaging for further investigation and/or treatment planning of suspected osteonecrosis (avascular necrosis):

- Initial plain x-ray imaging of the suspected area must first be performed after the current episode of symptoms started or changed

When the initial x-rays are negative or equivocal and the clinical symptoms warrant further investigation of osteonecrosis, the following advanced imaging is considered medically necessary:

- MRI without contrast, MRI without and with contrast, or CT without contrast of the area of interest

When the initial x-rays have confirmed osteonecrosis and advanced imaging is needed for further treatment planning the following advanced imaging is considered medically necessary for the follow situations:

- Shoulder - Humeral head - MRI without contrast (CPT® 73221) or CT without contrast (CPT® 73200)
- Wrist – Lunate/Scaphoid - MRI without contrast (CPT® 73221) or CT without contrast (CPT® 73200)
- Hip – Femoral head - MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
- Knee – Distal Femur - MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
- Ankle – Talus - MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
- Foot – Tarsal Navicular/Metatarsal head - MRI without contrast (CPT® 73718) or CT without contrast (CPT® 73700)

Individuals with acute lymphoblastic leukemia and known or suspected osteonecrosis should be imaged according to guidelines in **Acute Lymphoblastic Leukemia (PEDONC-3.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Known or suspected osteonecrosis in long-term cancer survivors should be imaged according to guidelines in **Osteonecrosis in Long Term Cancer Survivors (PEDONC-19.4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Evidence Discussion (MS-4)

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The American College of Radiology Appropriateness Criteria (ACR) for Osteonecrosis (revised 2022) has recommended radiography as the initial imaging study for clinically suspected osteonecrosis. Radiographs are less sensitive for detection of early osteonecrosis but they help to exclude other causes of extremity pain such as fracture, primary arthritis, or tumor. In late stage osteonecrosis, x-rays will also show findings of secondary osteoarthritis (Ha et al., 2022; Pierce et al., 2015). When x-rays are negative or equivocal, and osteonecrosis is still suspected, the ACR supports the use of advanced imaging to aid in further diagnosis and treatment planning (Ha et al., 2022).

Both CT and MRI are recommended as next step imaging options after plain x-rays are obtained. MRI has been shown to be both highly sensitive and specific to the detection of osteonecrosis. A 2018 meta-analysis demonstrated that MRI was 93% sensitive and 91% specific in the early detection of osteonecrosis of the femoral head (Zhang et al., 2018). A recent Delphi model to better predict femoral head collapse identified subchondral fracture as a key predictor. CT scans can provide important insights into the structural integrity of subchondral bone allowing for better treatment planning for patients with osteonecrosis (Yang et al., 2024). Preoperative CT has been shown to more clearly display the extent of articular collapse than radiographs (Lee et al., 2019). Both MRI and CT have been shown to have similar accuracy in displaying femoral head lesions in more advanced stages of osteonecrosis (ARCO stage III or greater) (Hu et al., 2015).

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Osteoporosis (MS-14)

Guideline

Osteoporosis (MS-14.1)
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Osteoporosis (MS-14.1)

MS.OP.0014.1
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Criteria

Initial plain x-ray imaging is not required to request advanced imaging for osteoporosis screening.

Quantitative CT (CPT® 77078) is considered medically necessary for **screening** when DXA scanner is unavailable or known to be inaccurate for ANY of the following populations:

- Women 65 years of age or older, Men 70 years of age or older
- Women less than 65 years of age who have the following additional risk factors for osteoporosis:
  - Estrogen deficiency
  - A history of maternal hip fracture that occurred after age 50 years
  - Low body mass (less than 127 lb or 57.6 kg)
  - History of amenorrhea (greater than 1 year before age 42 years)
- Women less than 65 years or men less than 70 years of age who have the following additional risk factors:
  - Current use of cigarettes
  - Loss of height, thoracic kyphosis
- Individuals of any age with the following:
  - Bone mass osteopenia or fragility fractures on imaging studies such as x-rays, CT, or MRI
  - Develop 1 or more insufficiency fractures
- Individuals 50 years of age and older who develop a wrist, hip, spine, or proximal humerus fracture with minimal or no trauma, excluding pathologic fractures.
- Premenopausal females, or males age 20 to 50 years, with risk factors known to potentially alter bone mineral density such as:
  - Chronic renal failure
  - Rheumatoid or other inflammatory arthritis
  - Eating disorders, including anorexia nervosa and bulimia
  - Organ transplantation
  - Prolonged immobilization

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  - Conditions associated with secondary osteoporosis, such as gastrointestinal malabsorption or malnutrition, sprue, osteomalacia, vitamin D deficiency, endometriosis, acromegaly, chronic alcoholism or established cirrhosis, and multiple myeloma
  - Individuals who have had gastric bypass for obesity
  - Individuals with an endocrine disorder known to adversely affect bone mineral density (e.g., hyperparathyroidism, hyperthyroidism, or Cushing syndrome)
- Individuals receiving (or expected to receive) glucocorticoid therapy for >3 months
- Hypogonadal men older than 18 years of age and men with surgically or chemotherapeutically-induced castration
- Individuals beginning or receiving long-term therapy with medications known to adversely affect BMD (e.g., anti-convulsant drugs, androgen deprivation therapy, aromatase inhibitor therapy, or chronic heparin)

NOTE: Repeat screening quantitative computed tomography (QCT) is considered medically necessary no sooner than every two years.

Quantitative CT scan (CPT® 77078) is considered medically necessary for **monitoring/ non-screening** when DXA scanner is unavailable or known to be inaccurate for ANY of the following circumstances:

- Follow-up in cases where QCT was the original study
- Multiple healed vertebral compression fractures
- Significant scoliosis
- Advanced arthritis of the spine due to increased cortical sclerosis often with large marginal osteophytes
- Obese individual over the weight limit of the dual-energy x-ray absorptiometry (DXA) exam table
- Individuals with BMI >35kg/m^2
- Extremes in body height (i.e., very large and very small individuals)
- Individuals with extensive degenerative disease of the spine
- A clinical scenario that requires sensitivity to small changes in trabecular bone density (parathyroid hormone and glucocorticoid treatment monitoring).

NOTE: Repeat monitoring/non-screening QCT is considered medically necessary no earlier than one year following a change in treatment regimen, and only when the results will directly impact a treatment decision.

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Evidence Discussion (MS-14)

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The primary diagnostic test used to screen for osteoporosis is the central dual x-ray absorptiometry (DXA) which accurately measures bone mineral density at the hip and lumbar spine. DXA accuracy and reproducibility has led to the established standards for diagnosis of osteoporosis by the World Health Organization (Akkawi & Zmerly, 2018). The USA Bone Health and Osteoporosis Foundation has recommended bone mineral density testing in all women age 65 and older and all men age 70 and older, and in postmenopausal women younger than 65 years and men aged 50-69 years based on their risk factor profile, including if they had a fracture as an adult (LeBoff et al., 2022). The American College of Radiology Appropriateness Criteria supports DXA as the primary diagnostic choice to screen women >65 years of age and men >70 years of age for osteoporosis, and for postmenopausal women <65 years of age with additional risk factors for fracture (Yu et al., 2022). Repeat bone mineral density assessments one to two years after initiating medical therapy for osteoporosis and every two years thereafter, but recognizes that testing more frequently may be warranted in certain clinical situations, and may be needed less frequently in patients without major risk factors or significant bone density loss on initial BMD testing. DEXA is currently the preferred method for monitoring treatment response (LeBoff et al., 2022).

Quantitative CT (QCT) is regarded as a secondary tool after DXA for screening for osteoporosis. QCT is highly accurate in determining tissue density within a region of interest. Indications for QCT are the same as for DXA; however, DXA is recommended as the first-line screening and follow-up test for bone density. If DXA is not available, QCT may be used as a secondary technique and for serial/follow-up purposes (Deshpande et al., 2023; LeBoff et al., 2022; Yu et al., 2022). Selected conditions in which QCT is considered superior to DXA include extremes in body height, BMI >35, clinical scenarios when an increased sensitivity to small changes in trabecular bone density is required, and in patients with advanced degenerative bony changes in the spine (Yu et al., 2022). A potential harm of Quantitative CT is increased radiation exposure (1-10mSv) as compared to <0.1mSv for DXA scan. The radiation dose for both lumbar spine and hip scanning in a DXA scan is approximately equivalent to that of a chest x-ray.

There is insufficient evidence to support the use of x-ray as a screening tool in patients suspected of having low bone mineral density. Patients whose x-rays report osteopenia and/or fragility fractures should be referred for DXA for further characterization of bone density. There is also insufficient evidence to support the current use of quantitative ultrasound as a screening tool in patients suspected of having low bone mineral density (Yu et al., 2022).

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General Pain (MS-32)

Guideline

General Pain (MS-32.1)
Evidence Discussion (MS-32)
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General Pain (MS-32.1)

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Criteria

As outlined in General Guidelines (MS-1.0), initial images and physical exam are required prior to requesting advanced imaging for further investigation and/or treatment planning. See specific details throughout the section regarding any requirements for when conservative care prior to requesting advanced imaging is required. The criteria in this section applies only to general musculoskeletal pain conditions not already specified in any other section of this guideline.

- Initial plain x-ray imaging of the suspected area must first be performed after the current episode of symptoms started or changed and results are available to the requesting provider

Advanced imaging for further investigation of general musculoskeletal pain is considered medically necessary as follows:

- **Shoulder** - MRI without contrast (CPT®73221) or CT with contrast (CPT® 73201) if MRI contraindicated
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Elbow** - MRI without contrast (CPT® 73221)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Wrist** - MRI without contrast (CPT® 73221), MRI with contrast (CPT® 73222), CT without contrast (CPT® 73200) or CT with contrast (CPT® 73201)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Hand** - MRI without contrast (CPT® 73218) or MRI without and with contrast (CPT® 73220)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required

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- **Pelvis** - MRI without contrast (CPT® 72195) or MRI right and/or left Hip without contrast (CPT® 73721)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Imaging for Sacroiliac and Coccygeal pain is guided by the Spine Imaging Guidelines (Sacroiliac Joint Pain/Sacroiliitis (SP-10.1) and Coccydynia without Neurological Features (SP-5.2))
- **Hip** - MRI without contrast (CPT® 73721)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Knee** - MRI without contrast (CPT® 73721)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - For patellofemoral pain or tracking issues where surgery is being considered - MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Ankle** - MRI without contrast (CPT® 73721)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Foot** - MRI without contrast (CPT® 73718)
  - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - For investigation of sesamoid disorders:
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
    - MRI without contrast (CPT® 73718) or CT without contrast (CPT® 73700) of the foot
  - For investigation of Complex Regional Pain Syndrome (CRPS) (Type 1) at the foot:

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- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- MRI Foot without contrast (CPT® 73718)
- Criteria regarding nuclear medicine imaging of CRPS is found in: **Nuclear Medicine (MS-28)**

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Evidence Discussion (MS-32)

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General, unspecific musculoskeletal pain and trauma may not always present in a definitive manner. An individual may present with symptoms similar to multiple differential diagnoses. Imaging, as part of a comprehensive examination and assessment, can be useful in these situations to help rule-in or -out a certain diagnosis so as to develop a clinical course of action. The American College of Radiology (ACR) has recommended x-ray as the initial evaluation image for the vast majority of non-specific acute (Bartolotta et al., 2025; Chen et al., 2024; Gorbachova et al., 2020; Laur et al., 2025; Smith et al., 2020; Taljanovic et al., 2020; Torabi et al., 2019) and chronic (Chang et al., 2018; Fox et al., 2018; Jawetz et al., 2023; Nacey et al., 2023; Stensby et al., 2024; Tafur et al., 2020; Thomas et al., 2022) musculoskeletal pain. Initial x-rays may provide sufficient information, along with the clinical evaluation, to form a diagnosis. These initial images can be helpful in determining if a course of conservative treatment is recommended. In some instances, the initial x-rays or US may help determine a diagnosis or that more advanced images or procedures are appropriate (Cuff et al., 2020).

Advanced imaging can often demonstrate abnormalities that have no relevance to the individual's symptoms. Studies have shown that advanced imaging may demonstrate musculoskeletal abnormalities that do not affect their quality of life (Schwartzberg et al., 2016). Focusing on incidental findings can lead to overtreatment through unnecessary referral to medical specialists or unneeded medical procedures. Advanced imaging can have additional risks to the individual beyond those of initial plain images. There are risks associated with additional exposure to radiation. There can also be complications due to implantable devices or metallic foreign bodies in the individual. Risk mitigation needs to be weighed when advanced imaging is being considered, especially in relation to repeat or serial advanced imaging (Pompan, 2011; Watson & Yu, 2023). Musculoskeletal complaints may respond to care prior to needing advanced imaging. Current ACR guidance has recommended obtaining initial plain x-rays and having the individual follow a course of provider directed conservative care prior to seeking advanced imaging for many nonspecific complaints (Chang et al., 2018; Fox et al., 2018; Jawetz et al., 2023; Nacey et al., 2023; Stensby et al., 2024; Tafur et al., 2020; Thomas et al., 2022). The potential clinical benefit of starting conservative care and not needing advanced images or additional procedures may outweigh the potential harm of a brief delay in obtaining said imaging.

MRI is commonly recommended as the next image technology of choice (Bartolotta et al., 2025; Chang et al., 2018; Chen et al., 2024; Gorbachova et al., 2020; Fox et al., 2018; Jawetz et al., 2023; Laur et al., 2025; Nacey et al., 2023; Smith et al., 2020;

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Stensby et al., 2024; Tafur et al., 2020; Taljanovic et al., 2020; Thomas et al., 2022; Torabi et al., 2019). The use of contrast media during imaging will depend on the clinical presentation and the particular tissues suspected to be injured. When x-rays are negative and there is suspicion of soft tissue involvement, MRI can be helpful to visualize tissue damage and effusion. CT may also be helpful in situations where MRI is contraindicated, or x-rays were unclear and bony involvement continues to be suspect (Bartolotta et al., 2025; Chang et al., 2018; Chen et al., 2024; Gorbachova et al., 2020; Fox et al., 2018; Jawetz et al., 2023; Laur et al., 2025; Nacey et al., 2023; Smith et al., 2020; Stensby et al., 2024; Tafur et al., 2020; Taljanovic et al., 2020; Thomas et al., 2022; Torabi et al., 2019).

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Post-Operative Follow-Up (MS-16)

Guideline

Joint Replacement Post-Operative Follow-Up (MS-16.1)
General Musculoskeletal Post-Operative Follow-Up (MS-16.2)
Evidence Discussion (MS-16)
References (MS-16)

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Joint Replacement Post-Operative Follow-Up (MS-16.1)

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Criteria

As outlined in General Guidelines (MS-1.0), the following must be met prior to requesting advanced imaging for further investigation and/or treatment planning of joint replacement post-op symptoms (e.g., aseptic loosening, infection, fracture, pseudotumor, implant performance):

- Plain x-ray imaging of the suspected area must first be performed after the current post-operative episode of symptoms started with results available to the requesting provider
- See specific details throughout the section regarding any requirements for when conservative care prior to requesting advanced imaging is required
- For suspected periprosthetic infection - Joint aspiration culture is the initial evaluation after plain x-ray for a painful joint replacement when periprosthetic infection is suspected
- Criteria regarding any **nuclear medicine imaging** of suspected post-operative joint replacement complications (e.g., aseptic loosening, peri-prosthetic fracture, suspected infection) is found in: **Nuclear Medicine (MS-28)**

Advanced imaging for further investigation of joint replacement post-operative follow-up is considered medically necessary as follows:

- **Shoulder**:
  - Suspected aseptic loosening or fracture – MRI without contrast (CPT® 73221), OR CT without contrast (CPT® 73200)
  - Suspected infection with negative or inconclusive aspiration culture – MRI without contrast (CPT® 73321), MRI without and with contrast (CPT® 73223) OR CT with contrast (CPT® 73201)
  - Possible rotator cuff tear – MRI without contrast (CPT® 73221) OR CT with contrast (CPT® 73201)
  - Possible nerve injury – MRI without contrast (CPT® 73221)
- **Elbow/Wrist**:
  - Suspected aseptic loosening or fracture – CT without contrast (CPT® 73200)

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- Suspected infection with negative or inconclusive aspiration culture – MRI without contrast (CPT® 73221), MRI without and with contrast (CPT® 73223) OR CT with contrast (CPT® 73201)

- **Hip**:
  - Suspected aseptic loosening or fracture – CT without contrast (CPT® 73700)
  - Suspected infection with negative or inconclusive aspiration culture – MRI without contrast (CPT® 73721), MRI without and with contrast (CPT® 73723), CT with contrast (CPT® 73701), OR CT without contrast (CPT® 73700)
  - Suspected particle disease (aggressive granulomatosis) after infection has been excluded – MRI without contrast (CPT® 73721), OR CT without contrast (CPT® 73700)
  - Suspected periprosthetic fracture after non-diagnostic x-ray – CT without contrast (CPT® 73700)
  - Suspected component malposition or heterotopic bone – CT without contrast (CPT® 73700)
  - Suspected metal-on-metal implant with high-risk of performance issues from cup-neck impingement and adverse local tissue reaction (ALTR, with Co and Cr ion levels greater than 10 ppb) – MRI without contrast (CPT® 73721)
  - Suspected Aseptic lymphocytic-dominated vasculitis lesion (ALVAL) pseudotumor surrounding metal-on-metal prosthesis – MRI without contrast (CPT® 73721)
  - Suspected tendinitis/bursitis, abductor injury or other soft tissue abnormality – US (CPT® 76881 or CPT® 76882) OR MRI without contrast (CPT® 73721)
    - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
  - Possible nerve injury – MRI without contrast (CPT® 73721)
- **Knee**:
  - Suspected aseptic loosening or fracture – MRI without contrast (CPT® 73721) OR CT without contrast (CPT® 73700)
  - Suspected infection with negative or inconclusive aspiration culture – MRI without contrast (CPT® 73721), MRI without and with contrast (CPT® 73723) OR CT with contrast (CPT® 73701)
  - Suspected periprosthetic fracture – MRI without contrast (CPT® 73721), OR CT without contrast (CPT® 73700)
  - Suspected osteolysis or component instability, rotation, or wear – MRI without contrast (CPT® 73721), OR CT without contrast (CPT® 73700)
  - Suspected periprosthetic soft tissue abnormality unrelated to infection (e.g. tendinopathy, arthrofibrosis, patellar clunk, impingement of nerves or soft tissue) - MRI without contrast (CPT® 73721)

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        - A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed is required
- **Ankle**:
    - Suspected aseptic loosening or fracture – CT without contrast (CPT® 73700)
    - Suspected infection with negative or inconclusive aspiration culture – MRI without contrast (CPT® 73721), MRI without and with contrast (CPT® 73723) OR CT with contrast (CPT® 73701)

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General Musculoskeletal Post-Operative Follow-Up (MS-16.2)

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Criteria

As outlined in General Guidelines (MS-1.0), the following must be met prior to requesting advanced imaging for further investigation and/or treatment planning of general musculoskeletal post-operative (post-op) symptoms (e.g., fracture fixation, tendon/ligament repair, labral repair):

- Plain x-ray imaging of the suspected area must first be obtained after the current post-operative episode of symptoms started and results are available to the provider
- A documented failure of 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current post-op episode of symptoms or physical exam findings started or changed

When all of the above criteria have been met, further investigation in symptomatic individuals is considered medically necessary for post-operative follow-up as follows:

- **Shoulder**:
  - Post rotator cuff repair – MRI without contrast (CPT® 73221), MRI with contrast (CPT® 73222) OR CT with contrast if MRI contraindicated (CPT® 73201)
  - Post impingement or labral repair - MRI without contrast (CPT® 73221), MRI with contrast (CPT® 73222) OR CT with contrast if MRI contraindicated (CPT® 73201)
- **Elbow**:
  - Post complex fracture surgery – CT without contrast (CPT® 73200)
  - Post soft-tissue surgery – MRI without contrast (CPT® 73221)
- **Wrist**:
  - Post complex fracture surgery – CT without contrast (CPT® 73200)
  - Post instability and/or ligament surgery (e.g., TFCC, DRUJ instability) surgery – MRI with contrast (CPT® 73222)
- **Hand**:
  - Post soft-tissue or complex fracture surgery – MRI without contrast (CPT® 73218) OR CT without contrast (CPT® 73200)
- **Pelvis**:

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  - Post complex pelvic ring/acetabular fracture surgery – CT without contrast (CPT® 72192)
- **Hip**:
  - Fracture surgery or post-op for avascular necrosis – MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700)
  - Post Femoroacetabular Impingement or labral repairs – MRI with contrast (CPT® 73722)
- **Knee**:
  - Post fracture or dislocation surgery – CT without contrast (CPT® 73700)
  - Post ligament reconstruction or meniscus tear surgery – MRI without contrast (CPT® 73721) OR MRI with contrast (CPT® 73722)
- **Ankle**:
  - Post complex fracture surgery – CT without contrast (CPT® 73700)
  - Post ligament or tendon injury surgery – MRI without contrast (CPT® 73721)
- **Foot**:
  - Post complex fracture surgery – CT without contrast (CPT® 73700)
  - Post ligament, tendon or plantar plate surgery – MRI without contrast (CPT® 73718)

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Evidence Discussion (MS-16)

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The American College of Radiology (ACR) has recommended plain x-rays as the initial study for routine follow up of asymptomatic patients and symptomatic individuals who have undergone surgery for musculoskeletal injury (Nacey et al., 2023; Roberts et al., 2022; Walker et al., 2023; Weissman et al., 2023). Plain x-rays can identify fractures and show signs of hardware loosening, wear, osteolysis or infection. Blood tests and joint aspiration with synovial fluid laboratory analysis may be sufficient to diagnosis post-surgical infection. Joint aspiration with synovial fluid analysis remains the most useful test for confirming the presence or absence of infection and identifying the causative organism (Roberts et al., 2022; Schinsky et al., 2008; Toms et al., 2006; Walker et al., 2023; Weissman et al., 2023; Zahar & Sarungi, 2021). When plain x-rays, and laboratory tests as applicable, are negative or inconclusive and there is a suspicion of post-surgical complications, advanced imaging can help to identify what may be the cause of the individual's symptoms.

When there is suspicion of a post-surgical soft tissue abnormality (e.g., tendinitis, tendinopathy, bursitis, arthrofibrosis), a course of conservative care prior to advanced imaging can allow many individuals to improve (American Academy of Orthopaedic Surgeons, 2020; Nawabi et al., 2014), thus eliminating the need for advanced imaging. This may avoid unnecessary exposure to radiation from imaging and additional costs of imaging. If there is a documented failure to improve, advanced imaging would be appropriate. Suspicion of more significant complications following joint surgery may benefit from advanced imaging without a trial of conservative care.

The ACR further recommended MRI and CT as advanced imaging options when further assessing post-surgical complications. Their recommendations vary based on the clinical scenario (Roberts et al., 2022; Walker et al., 2023; Weissman et al., 2023). Complications with implanted hardware (e.g., loosening, component rotation, hardware fracture) may greatly impair an individual's function and may lead to additional negative sequelae if not addressed in a timely manner. MRI has been identified as accurate diagnostic tools in evaluating aseptic loosening following knee replacement (Jette et al., 2020). Suspected torn rotator cuff tendons in individuals that have undergone total shoulder arthroplasty may also be difficult to diagnose without advanced imaging due to the various techniques used to release the subscapularis tendon during surgery (Roberts et al., 2022). MRI has been demonstrated to have good intra- and inter-rater reliability in determining the structural integrity of tendons following surgery (Buijs et al., 2024; Saccomanno et al., 2015). Individuals with metal-on-metal hip replacements are at risk for adverse local tissue reactions including metallosis, pseudotumor and generalized synovitis that could result in tissue damage. Prompt evaluation, including

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advanced imaging, would be appropriate to best mitigate these risks (Gyftopoulos et al., 2022; Hall et al., 2020).

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Tissue Growths, Masses and Cysts (MS-10)

Guideline

Soft Tissue Mass and Morton's Neuroma (MS-10.1)
Bone Lesion (MS-10.2)
Cysts (MS-10.3)
Evidence Discussion (MS-10)
References (MS-10)

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Soft Tissue Mass and Morton's Neuroma (MS-10.1)

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Criteria

As outlined in General Guidelines (MS-1.0), the following must be met prior to requesting advanced imaging for further investigation and/or treatment planning of soft tissue masses and Morton's neuroma:

- Initial plain x-ray imaging of the suspected area must first be performed after the current episode of symptoms started. Results of these plain x-rays need to be available to the requesting provider
- Additional documentation of clinical features if specifically stated below
- See specific details throughout the section regarding any requirements for when conservative care prior to requesting advanced imaging is required

Soft Tissue Mass

Plain x-ray is considered medically necessary as the initial imaging study, with the exception of individuals with cancer predisposition syndrome (if there is a known or suspected soft tissue mass in an individual with a cancer predisposition syndrome, see: Screening Imaging in **Cancer Predisposition Syndromes (PEDONC-2)** in the Pediatric and Special Populations Oncology Imaging Guidelines). History and physical exam of any palpable soft tissue mass should include documentation of any one or more of the following clinical features:

- Increase in volume/size
- More than 5cm in diameter
- Painful
- Deep or subfascial location

After the initial history, exam and plain imaging have been performed and further investigation is needed the following advanced imaging is considered medically necessary for evaluation of soft tissue masses:

- MRI without and with contrast, or MRI without contrast of the area of interest (CPT® 76881 or 76882) is considered medically necessary when ANY of the following are met after plain x-ray:

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  - Soft tissue mass(es) which are increasing in volume/size, more than 5cm in diameter, painful or deep or in a subfascial location
  - Surgical planning
- CT with contrast or CT without and with contrast is appropriate when MRI is contraindicated or after a metal limiting MRI evaluation

Advanced imaging is considered not medically necessary for subcutaneous lipoma with no surgery planned

Tarsal Tunnel Syndrome soft tissue mass entrapment (Baxter's Neuropathy)

After the x-rays have been performed and results are available to the provider, and there has been failure of at least 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms or physical exam findings started or changed, the following advanced imaging is considered medically necessary for preoperative planning if mass is suspected as etiology of entrapment:

- MRI Foot without contrast (CPT® 73718)

Morton's Neuroma

After the x-rays have been performed and results are available to the provider, and there has been failure of at least 6 weeks of provider-directed conservative treatment, including clinical re-evaluation, occurring after the current episode of symptoms started, the following advanced imaging is considered medically necessary for further investigation of Morton's Neuroma for preoperative planning:

- MRI Foot without contrast (CPT® 73718) or MRI Foot without and with contrast (CPT® 73720)

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Bone Lesion (MS-10.2)

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Criteria

As outlined in General Guidelines (MS-1.0), the following must be met prior to requesting advanced imaging for further investigation and/or treatment planning of suspected abnormal bone growth or lesion:

- Initial plain x-ray imaging of the entire bone containing the lesion must first be performed after the current episode of symptoms started. Results need to be available to the requesting provider.

After the x-rays have been performed and further investigation is needed, advanced imaging is considered medically necessary for the following scenarios:

- Diagnosis uncertain based on plain x-ray appearance - MRI without contrast, MRI without and with contrast, or CT without contrast
- Imaging requested for preoperative planning – MRI without contrast, MRI without and with contrast, or CT without contrast
- Plain x-ray reveals an osteochondroma with clinical concern of malignant transformation - MRI without contrast or MRI with and without contrast
- For Paget's Disease - MRI (contrast as requested) can be considered if the diagnosis (based on plain x-rays and laboratory studies) is in doubt or malignant degeneration is suspected
    - Criteria regarding **nuclear medicine imaging** is found in: **Nuclear Medicine (MS-28)**

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Cysts (MS-10.3)

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Criteria

As outlined in General Guidelines (MS-1.0), the following must be met prior to requesting advanced imaging for treatment planning of soft tissue masses and cysts:

- Initial plain x-rays must be performed after the current episode of symptoms started or changed. Results need to be available to the requesting provider.

After the initial imaging has been performed and further investigation is needed for surgical planning to address ganglion or other musculoskeletal related cysts (e.g., Popliteal), the following advanced imaging is considered medically necessary:

- **Ganglion Cyst** - MRI without contrast or MRI without and with contrast
- **Popliteal (Baker's) Cyst** - MRI Knee without contrast (CPT® 73721)

Advanced imaging is considered not medically necessary for:

- Ganglia that can be diagnosed by history and physical examination
- Sebaceous cyst, as these cysts are benign and additional imaging typically will not change the treatment plan

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Evidence Discussion (MS-10)

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The American College of Radiology (ACR) has recommended the use of x-rays as the initial image when evaluating suspected bone tumor. They recommended that a complete x-ray of the entire lesion-containing bone be evaluated prior to considering any advanced imaging (Ahlawat et al., 2025). Many benign bone tumors have a characteristic appearance on plain x-ray. Along with a relevant history and physical examination, x-rays may be sufficient for diagnosis and would avoid additional cost and risks associated with advanced images. If plain x-rays are equivocal, they may still direct further imaging with the correct modality. Furthermore, plain x-ray may provide complementary information to advanced imaging, allowing for a better overall interpretation. Clearly benign findings on exam (lipoma, ganglion, sebaceous cyst) do not need additional imaging prior to treatment unless the imaging was necessary for surgical management or for a possible malignancy.

When diagnostic uncertainty remains and concerns for malignant degeneration still exist, or imaging is requested for surgical planning, advanced imaging would be medically necessary. MRI is a superior modality for evaluation of many bone tumors. The ACR recommended MRI as the primary modality for advanced imaging of primary bone tumors. MRI can be useful in narrowing down differential diagnoses and in determining the need for biopsy (Ahlawat et al., 2025). CT may be appropriate when an individual presents with contraindications to MRI.

Current ACR recommendations have supported plain x-ray as an initial imaging option when evaluating individuals with suspicion of superficial soft tissue masses (Garner et al., 2023). X-ray can be helpful in visualizing soft tissue masses and aid in further management planning. It is often the modality of choice for initial imaging.

Common clinical features of soft tissue sarcoma can be helpful in the differentiation of soft tissue masses and decisions for additional biopsy. In many cases, a thorough exam, history and initial imaging may be sufficient to determine a diagnosis and management plan (Rochwerger & Mattei, 2018). When clinical findings and initial imaging is insufficient to diagnose suspicious soft tissue masses, MRI without and with IV contrast is primarily recommended as the next advanced image of choice (Garner et al., 2023; Hayes et al., 2025; Jacobson et al., 2022; Khan et al., 2020). MRI capabilities present many advantages to other imaging techniques for the use of advanced diagnostics of soft tissue masses. Improved contrast, multiplanar views, visualization of involved vascular structures and better demarcation between tissue types/levels (with the aid of contrast agents) are among the most prominent advantages to MRI (Garner et al., 2023; Hayes et al., 2025). When MRI is contraindicated, CT

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imaging without and with IV contrast can provide similarly diagnostic data as MRI and is considered an important adjunct option to MRI (Garner et al., 2023).

ACR imaging recommendations supports both plain x-ray and ultrasound as initial imaging options when evaluating individuals with suspicion of soft tissue cysts (Garner et al., 2023). While x-ray findings may not fully demonstrate a small ganglionic mass, they can still be beneficial in visualizing the surrounding anatomy and in determining the next steps for care. In a recent systematic review of 941 ganglion cyst cases, MRI and US were the most commonly reported imaging study. It was recommended that US can be a beneficial option for triage. However, it was found that MRI was much better at showing the underlying pathoanatomy of masses and their surrounding area than US when evaluating intraneural ganglion cysts (Lenartowicz et al., 2022). The utility of MRI for preoperative visibility of dorsal wrist ganglion and any associated pathoanatomy has also been demonstrated. MRI would be more useful for preoperative planning (Ferreira Branco et al., 2024).

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Procedure Codes Associated with Musculoskeletal Imaging (MS)

Guideline

Procedure Codes Associated with Musculoskeletal Imaging (MS)

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Procedure Codes Associated with Musculoskeletal Imaging (MS)

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MRI/MRA	CPT®
MRI Upper Extremity, other than joint, without contrast	73218
MRI Upper Extremity, other than joint, with contrast	73219
MRI Upper Extremity, other than joint, without and with contrast	73220
MRI Upper Extremity, any joint, without contrast	73221
MRI Upper Extremity, any joint, with contrast	73222
MRI Upper Extremity, any joint, without and with contrast	73223
MR Angiography Upper Extremity without or with contrast	73225
MRI Lower Extremity, other than joint, without contrast	73718
MRI Lower Extremity, other than joint, with contrast	73719
MRI Lower Extremity, other than joint, without and with contrast	73720
MRI Lower Extremity, any joint, without contrast	73721
MRI Lower Extremity, any joint, with contrast	73722
MRI Lower Extremity, any joint, without and with contrast	73723
MR Angiography Lower Extremity without or with contrast	73725
MRI Pelvis without contrast	72195
MRI Pelvis with contrast	72196

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MRI/MRA	CPT®
MRI Pelvis without and with contrast	72197

CT/CTA	CPT®
CT Upper Extremity without contrast	73200
CT Upper Extremity with contrast	73201
CT Upper Extremity without and with contrast	73202
CT Angiography Upper Extremity without and with contrast	73206
CT Lower Extremity without contrast	73700
CT Lower Extremity with contrast	73701
CT Lower Extremity without and with contrast	73702
CT Angiography Lower Extremity without and with contrast	73706
CT Pelvis without contrast	72192
CT Pelvis with contrast	72193
CT Pelvis without and with contrast	72194
Bone Mineral Density CT, one or more sites, axial skeleton	77078

Nuclear Medicine	CPT®
Bone Marrow Imaging, Limited	78102
Bone Marrow Imaging, Multiple	78103
Bone Marrow Imaging, Whole Body	78104
Bone or Joint Imaging Limited	78300

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Nuclear Medicine	CPT®
Bone or Joint Imaging Multiple	78305
Bone Scan Whole Body	78306
Bone Scan 3 Phase Study	78315
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (e.g., head, neck, chest, pelvis), single day imaging	78800
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days	78801
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging	78802
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (e.g., head, neck, chest, pelvis), single day imaging	78803
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (e.g., head, neck, chest, pelvis), single day imaging	78830
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78831

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Nuclear Medicine	CPT®
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78832

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General (Neck-1)

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Abbreviations for Neck Imaging Guidelines

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Abbreviations for Neck Imaging Guidelines	
ACSS	anterior cervical spine surgery
ALS	amyotrophic lateral sclerosis
CT	computed tomography
ENT	Ear, Nose, Throat
FNA	fine needle aspiration
FEES	fiberoptic endoscopic evaluation of swallowing
FFL	flexible fiberoptic laryngoscopy
FOE	fiberoptic exam for laryngoscopy
GERD	gastroesophageal reflux disease
GI	gastrointestinal
HIV	human immunodeficiency virus
HPV	human papillomavirus
MEN-2	multiple endocrine neoplasia
MRI	magnetic resonance imaging
TNE	transnasal esophagoscopy
VFSS	videofluoroscopic swallow study

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General Guidelines (Neck-1.0)

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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
- Advanced imaging of the neck covers the following areas:
  - Skull base (thus, a separate CPT® code for head imaging in order to visualize the skull base is considered not medically necessary)
  - Nasopharynx
  - Upper oral cavity to the head of the clavicle
  - Parotid glands and the supraclavicular region
- Ultrasound of neck soft tissues including thyroid, parathyroid, parotid and other salivary glands, lymph nodes, cysts, etc. can be helpful in more ill-defined masses or fullness and differentiating adenopathy from mass or cyst, to define further advanced imaging.
- CT Neck
  - CT Neck is usually obtained with contrast only (CPT® 70491).
    - With the exception of 4D CT Neck without and with contrast (CPT® 70492) for parathyroid adenoma localization, little significant information is added by performing a CT Neck without and with contrast (CPT® 70492), and there is the risk of added radiation exposure, especially to the thyroid.
    - CT Neck without contrast (CPT® 70490) can be difficult to interpret due to difficulty identifying the blood vessels.
      - Exceptions include:
        - Contrast is generally considered not medically necessary when evaluating known or suspected tracheal anomalies with CT.
        - Additionally, non-contrast CT is considered medically necessary for the evaluation of salivary duct stones in the appropriate clinical circumstance where intravenous contrast may obscure high attenuation stones. Dual-phase CT imaging (without and with IV contrast) is considered not medically necessary in this situation.

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        - Contrast enhanced CT is helpful in the assessment of cervical adenopathy and preoperative planning, including in the setting of thyroid carcinomas.
            - Contrast may cause intense and prolonged enhancement of the thyroid gland which interferes with radioactive iodine nuclear medicine studies.
            - Use of IV contrast is an important adjunct, however, because it helps to delineate the anatomic relationship between the primary tumor and metastatic disease. Iodine is generally cleared within four to eight weeks in most individuals, so concern about iodine burden from IV contrast causing a clinically significant delay in subsequent whole-body scans (WBSs) or radioactive iodine (RAI) treatment after the imaging followed by surgery is generally unfounded. The benefit gained from improved anatomic imaging generally outweighs any potential risk of a several week delay in RAI imaging or therapy. Where there is concern, a urinary iodine to creatinine ratio can be measured.
- MRI Neck
    - MRI Neck is used less frequently than CT Neck.
    - MRI Neck without and with contrast (CPT® 70543) is considered medically necessary if CT suggests the need for further imaging or if ultrasound or CT suggests any of the following:
        - Neurogenic tumor (schwannoma, neurofibroma, glomus tumor, etc.)
        - Vascular malformations
        - Deep neck masses
        - Angiofibromas
        - Cystic neck mass
        - Concern for malignancy (see **Squamous Cell Carcinomas of the Head and Neck (ONC-3)**, **Salivary Gland Cancers (ONC-4)**, or **Thyroid Cancer (ONC-6)** as appropriate)
    - MRI Neck without and with contrast (CPT® 70543) is considered medically necessary if the head and neck surgeon or neurosurgeon, or the provider in consultation with the head and neck surgeon or neurosurgeon, has reasonable clinical concern:
        - for a skull base or nasopharyngeal neoplasm, or potential perineural invasion/ cranial nerve involvement.
        - that extensive dental amalgam may obscure the anatomy on CT in individuals with oral cavity neoplasm.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants

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of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Dysphagia and Upper Digestive Tract Disorders (Neck-3)

Guideline

Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)
References (Neck-3)

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Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)

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Criteria

- **General considerations**
  - A detailed history of the dysphagia symptoms is important to distinguish neurogenic, pharyngeal and esophageal disorders.
  - Dysphagia (difficulty swallowing) can be the result of a wide range of benign and malignant processes that affects the body's ability to move food or liquid from the mouth to the pharynx and into the esophagus.
  - A short duration (weeks to months) of rapidly progressive esophageal dysphagia with associated weight loss is highly suggestive of esophageal cancer.
- **Gastroesophageal reflux disease (GERD)**
  - Advanced imaging is considered not medically necessary for the evaluation of GERD, the diagnosis of which is usually made on the basis of clinical history, in conjunction with endoscopy, pH monitoring, Upper GI Barium Studies, and occasionally manometry. Exceptions would include the following:
    - Non-cardiac chest pain suspected of being GERD should be evaluated first to exclude cardiac and other etiologies. See **Non-Cardiac Chest Pain-Imaging (CH-4.1)** in the Chest Imaging Guidelines.
    - Gastric emptying study (CPT® 78264) for individuals with refractory GERD symptoms, and gastroparesis is being considered.
- **Suspected foreign body impaction and ingested foreign bodies**
  - Plain x-rays are considered medically necessary as initial imaging.
  - If imaging is inconclusive, and/or there is suspicion of a radiolucent foreign body (such as fish or chicken bones, wood, plastic, thin metal objects, aluminum can pop-ups, etc.):
    - CT Neck and/or Chest with or without contrast (CPT® 70491 or CPT® 70490 and/or CPT® 71260 or CPT® 71250)
    - If requested, 3-D reconstruction (CPT® 76377 or CPT® 76376) is considered medically necessary in this setting.
- **Oropharyngeal dysphagia**
  - Oropharyngeal dysphagia (difficulty in transferring food from the mouth to the pharynx)
    - Suspected neurologic causes: See appropriate sections in Head Imaging Guidelines.

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    - Initial evaluation is with direct visualization (with laryngoscopy and/or upper endoscopy).
        - Flexible fiberoptic laryngoscopy (FFL), FiberOptic Exam for laryngoscopy (FOE), TransNasal Esophagoscopy (TNE) and/or FEES (Fiberoptic Endoscopic Evaluation of Swallowing). FEES is a dynamic evaluation of swallowing via direct visualization using transnasal laryngoscopy during speech pathologist-guided oral intake of various consistencies.
    - CT Neck with contrast (CPT® 70491) is considered medically necessary for any documented anatomic abnormalities suggested by direct visualization—i.e., on exam with flexible laryngoscopy or rigid video stroboscopy or FEES.
- **Esophageal dysphagia**
    - Esophageal dysphagia (difficulty in transferring food down the esophagus in the retrosternal region, e.g., food sticking in the neck or chest)
        - Initial evaluation is with barium esophagram or upper gastrointestinal endoscopy.
        - Advanced imaging is considered medically necessary for the evaluation of structural abnormalities demonstrated on either esophagram or direct visualization (i.e., laryngoscopy/upper GI endoscopy), such as an external compression, tumor, stricture, diverticulum, etc.
            - Contrasted CT Neck (CPT® 70491), CT Chest (CPT® 71260), **and/or** CT Abdomen (CPT® 74160) depending on the location of the abnormality identified.
- **Suspected perforation, abscess, or fistula**
    - CT Neck, Chest, **and/or** Abdomen, contrast as requested is considered medically necessary (preferably with contrast- CPT® 70491, CPT® 71260, CPT® 74160), depending on location.
- **Hiatal hernia**
    - See **Hiatal Hernia (AB-12.3)** in the **Abdomen Imaging Guidelines**.
- **Globus sensation**
    - For individuals with globus sensation (i.e., the sensation of a lump or foreign body in the throat), CT Neck with contrast (CPT® 70491) is considered medically necessary when laryngoscopy and/or upper endoscopy has been performed and the following criteria are met:
        - Negative or equivocal findings on laryngoscopy and/or upper endoscopy and at least one of the following **red flags**:
            - Weight loss
            - Odynophagia/throat pain
            - Referred otalgia
            - Hoarseness
            - Hemoptysis

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  - Other unilateral presentation of concerning symptoms
  - Known history of upper aerodigestive or esophageal malignancy
  - Known history of lymphoma
  - History of previous neck, esophageal, or gastric surgery
  - Palpable abnormality on physical examination such as neck mass
- **Post-operative dysphagia**
  - Dysphagia following surgery on the oropharynx, soft tissues of the neck, cervical spine, esophagus, or stomach:
    - In the immediate post-operative period, within 3 months of the surgery, the concern is for fluid collections, anastomotic leaks, perforations, and abscess. Prior laryngoscopy/upper endoscopy and barium esophagram are considered not medically necessary initially.
      - CT Neck with contrast (CPT® 70491) **AND/OR** CT Chest with contrast (CPT® 71260)
    - In the delayed post-operative period—three months or greater from surgery, the primary modalities for evaluation are history, physical, endoscopy (laryngoscopy or EGD) and/or barium esophagram/videofluoroscopic swallow study (VFSS) to direct any additional advanced imaging.
      - If the results of endoscopy and/or barium esophagram or VFSS are abnormal or inconclusive, the following is considered medically necessary:
        - CT Neck with contrast (CPT® 70491) **AND/OR** CT Chest with contrast (CPT® 71260)
- **Suspected vascular ring** (See **Dysphagia (PEDNECK-5)**)
  - CTA Chest (CPT® 71275) **OR** MRA Chest (CPT® 71555) are the preferred imaging studies in the evaluation of a suspected vascular ring.
  - CT Chest with contrast (CPT® 71260) **OR** MRI Chest without contrast (CPT® 71550) **OR** MRI Chest without and with contrast (CPT® 71552) can be performed as alternative exams in the evaluation of suspected vascular ring.

Evidence Discussion

Dysphagia

- Imaging studies are complementary to endoscopy (and in certain cases, also manometry) in the evaluation of esophageal dysphagia. The optimal imaging study depends on the nature and location of the dysphagia, as well as clinical setting (Mari et al., 2025).
- Modified barium swallow study (videofluoroscopic procedure performed in conjunction with a speech therapist) is generally first line for oropharyngeal dysphagia with an attributable cause. CT is generally considered not medically necessary because it does not assess motility, nor the oropharyngeal and esophageal mucosa as well.

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CT may be helpful for subsequent evaluation if initial studies are not revealing, or if there are suspicious findings on direct visualization (Expert Panel on Gastrointestinal Imaging et al., 2019).

- Barium esophagram is considered medically necessary for initial imaging of retrosternal dysphagia. CT is generally considered not medically necessary because it does not assess motility, nor esophageal mucosa as well. CT may be helpful if subsequent evaluation if initial studies are not revealing, or if there are suspicious findings on direct visualization and/or barium esophagram (Expert Panel on Gastrointestinal Imaging et al., 2019).
- Fluoroscopy still remains the imaging of choice for initial evaluation of early (as well as late) post-operative dysphagia, within the oropharyngeal or retrosternal regions. Utilizing a water-soluble contrast first, followed by barium if necessary, suspected leaks or fistulas may be investigated. Esophagrams are highly specific for leaks, but not as sensitive as CT. If high clinical suspicion remains following negative esophagram, esophagography and CT combined have a sensitivity and negative predictive value of 100%, but a specificity of 27% and positive predictive value of 56% (Expert Panel on Gastrointestinal Imaging et al., 2019).
- For oropharyngeal and retrosternal dysphagia, contrasted CT of the neck and/or chest is considered medically necessary when there is concern of early post-operative complications, such as leak, fluid collection, abscess, or hematoma (Expert Panel on Gastrointestinal Imaging et al., 2019).

Dysphagia and Upper Digestive Tract Disorders Health Equity Considerations

- Dysphagia is more commonly reported in individuals who are female, White/Caucasian, non-Hispanic, of older age, low income, of public insurance, and unemployed (Zheng et al.,2023; Zagloul et al., 2024).
- Individuals who are female and White/Caucasian are less likely to pursue diagnostic testing for upper digestive tract disorders (Zagloul et al., 2024).
- GERD is more common in females, but the rate of complications is higher in males (Bains et al., 2024).
- Hispanic and Latino Americans have the highest prevalence of GERD among all minority populations in the United States (Kamal et al., 2023).
- Reflux is more common in individuals who are female, White/Caucasian, non-Hispanic, and of public insurance (Osafo et al., 2025).

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Neck Mass/Swelling/ Adenopathy (Neck-5)

Guideline

Neck Mass/Swelling/Adenopathy (Neck-5.1)
References (Neck-5)

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Neck Mass/Swelling/Adenopathy (Neck-5.1)

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Criteria

- Cervical lymphadenitis is common and follows most viral or bacterial infections of the ears, nose and throat. Painful acute lymphadenopathy should be treated with a trial of conservative therapy for 2-weeks, including antibiotics if appropriate. If there is improvement with conservative treatment, advanced imaging is considered not medically necessary. If the adenopathy persists, it can be imaged as per below.
- CT Neck with contrast (CPT® 70491) is considered medically necessary if:
  - Neck mass with any ONE of the following:
    - Size greater than or equal to 1.5cm
    - Mass present greater than or equal to 2 weeks or of uncertain duration
    - Non-tender neck masses
    - Firm texture or fixation of the mass
    - Suspected peritonsillar, retropharyngeal or other cervical space abscess
    - Ulceration of skin overlying the neck mass
    - Ear pain ipsilateral to the neck mass
    - Associated onset of hoarseness persistent for greater than 3-weeks
    - Associated onset of throat pain, tonsil asymmetry, oral or oropharyngeal ulceration, weight loss, or hemoptysis
    - History of malignancy that would be primary or metastatic to the neck
    - Prior ultrasound results, if performed, are suspicious or indeterminate for malignancy
  - Isolated tonsil asymmetry with concerning features such as suspicious appearance, firmness, palatal immobility, rapid unilateral enlargement, history of malignancy, or immune compromise. This may or may not be accompanied by a neck mass.
  - Carcinoma found in a lymph node or other neck mass
  - Suspected or known sarcoidosis
  - Preoperative evaluation of any neck mass
  - Foreign body migration with neck swelling
- MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary if:
  - CT suggests the need for further imaging

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  - Ultrasound or CT suggests neurogenic tumor (schwannoma, neurofibroma, glomus tumor, etc.), vascular malformations, cystic neck mass, deep neck masses, or angiofibroma
- MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is also considered medically necessary without prior CT Neck or ultrasound requirement, if the head and neck specialist, or the provider in consultation with the head and neck specialist, has reasonable clinical concern for:
  - skull base or nasopharyngeal neoplasm, **OR**
  - potential perineural invasion/cranial nerve involvement, **AND/OR**
  - extensive dental amalgam which may obscure the anatomy on CT in individuals with oral cavity neoplasm.
- Congenital cervical sinus, fistula, or cyst for preoperative planning:
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)

Evidence Discussion

- CT has several benefits that support its utilization as a primary imaging modality, including its availability and cost. CT imaging is generally easily tolerated by individuals because of short scanning time (less than 5 minutes) and large scanner bore. While CT utilizes ionizing radiation, the average dose of 3 mSv (equivalent to approximately 150 chest x-rays) is considered acceptable in the adult population (Walasangikar et al., 2021).
- MRI is preferred for tumors of the nasopharynx or when there is a cranial nerve concern on physical examination because of its sensitivity to abnormalities of the skull base and in the detection of perineural spread. MRI also offers improved tissue contrast and can help detect subclinical tumors not evident with nasal endoscopy (Walasangikar et al., 2021).
- Ultrasound is also used to characterize neck masses, to guide tissue sampling, and to search for additional masses. It is both noninvasive and inexpensive. Ultrasound is, however, best suited for evaluation of superficial tissue, in situations where there will be a delay in obtaining CT or MRI, if the use of contrast medium is contraindicated, or as an adjunct to expedite FNA biopsy (Feier et al., 2022).
- Tonsil asymmetry is a common exam finding in both adults and children and is often benign. In cases of associated suspicious characteristics, neck imaging is medically necessary, even if there is not an associated neck mass (Gao et al., 2026).

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Recurrent Laryngeal Nerve Palsy (Neck-7)

Guideline

Recurrent Laryngeal Nerve Palsy (Neck-7.1)
References (Neck-7)

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Recurrent Laryngeal Nerve Palsy (Neck-7.1)

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Criteria

- The following are considered medically necessary with new diagnosis of idiopathic unilateral vocal fold paralysis/immobility or weakness, as identified on videostroboscopy or laryngoscopy by an Otolaryngologist—Head and Neck surgeon, or a clinician in consultation with such a specialist:
  - MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551)

    AND
  - MRI Orbit/Face/Neck with and without contrast (CPT® 70543) **OR** CT Neck with contrast (CPT® 70491)

    AND
  - CT Chest with contrast (CPT® 71260)

Evidence Discussion

Evaluation of Idiopathic Unilateral Vocal Fold Paralysis/Immobility

- Idiopathic unilateral vocal fold immobility is a diagnosis of exclusion. When it is noted that a vocal cord is immobile on laryngoscopy, the etiology must be sought. If it is not apparent on history and laryngoscopy, this work-up involves imaging the entire pathway of the motor nerve supply to the involved side of the larynx—from the skull base to the superior mediastinum (Politano et al., 2021).
- Repeat imaging for a pre-existing diagnosis of idiopathic unilateral vocal cord paralysis may be considered on a case by case basis. Recommendations include possibly repeating advanced imaging as above within 5 years after initial diagnosis and workup, or performing regular (annual) clinical evaluations with imaging reserved for the development of new symptoms or exam findings (Noel et al., 2016).
- Contrasted CT Chest can play a role in the evaluation of left vocal cord palsy due to its anatomical position. The nerve extends down to varying degrees depending on if it is on the right or left side. On the right side, it can extend into the upper mediastinum, going under the subclavian artery. On the left side, it can extend to just beneath the aortic arch (Paquette et al., 2012). According to Paquette et al. (2012), "On average, the right RLN is 5-6 cm in length from its origin at the level of the brachiocephalic artery to the cricothyroid joint, whereas the left RLN is nearly 12 cm in length from

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its origin at the aortic arch, with much of its course being mediastinal". For these reasons, depending upon the facility performing the CT, a CT Neck may not go far enough into the chest to view the complete nerve in which case a CT chest will also be needed (Stonebraker et al., 2025).

Recurrent Laryngeal Nerve Palsy Health Equity Considerations

- Individuals with a higher socioeconomic status typically receive a greater number of interventions for recurrent laryngeal nerve palsy, as well as a longer duration of care (Nourmahnad et al., 2024).

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Thyroid and Parathyroid (Neck-8)

Guideline

Thyroid Nodule (Neck-8.1)
Hyperthyroidism and Hypothyroidism (Neck-8.2)
Parathyroid Imaging (Neck-8.3)
Parathyroid Incidentaloma (Neck-8.4)
References (Neck-8)

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Thyroid Nodule (Neck-8.1)

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Criteria

- **Serum thyrotropin (TSH)** should be measured in the initial evaluation of thyroid nodule/mass/asymmetry/goiter but is considered not medically necessary for follow-up imaging.
- See **Thyroid Cancer-Surveillance/Follow-Up (ONC-6.4)** for thyroid nodules that are biopsy proven thyroid cancer but are being monitored on active surveillance.
- A thyroid nodule detected for the first time during pregnancy should be managed in the same way as in non-pregnant individuals, except for avoiding the use of radioactive agents for diagnostic and therapeutic purposes.
- **Nuclear scan (CPT®78013 or CPT® 78014)** is considered medically necessary if the serum TSH is subnormal and ANY of the following:
  - Single or multiple thyroid nodules
  - Suspicion of ectopic thyroid tissue
  - Presence of thyroid nodule in the setting of Grave's disease
- **Nuclear medicine thyroid scan (CPT® 78013 or CPT® 78014)** is considered medically necessary for ANY of the following (TSH is considered not medically necessary prior to imaging in the below settings):
  - Evaluate eligibility for radioiodine therapy
  - Select nodules to biopsy in multinodular goiter even if TSH not low
  - Substernal goiter with compressive symptoms (e.g., dyspnea, stridor, cough, dysphonia, dysphagia)
  - Non-diagnostic or indeterminate FNA of thyroid nodule (e.g., follicular lesion of undetermined significance), to see if hot (functioning) nodule that may be benign vs cold nodule
- Following thyroid ultrasound, **CT Neck with contrast (CPT® 70491), or CT Neck without contrast (CPT® 70490), or MRI Orbit/Face/Neck without contrast (CPT® 70540), or MRI Orbit/Face/Neck without and with contrast (CPT® 70543)** is considered medically necessary for ANY of the following:

  Imaging should be done only after initial thyroid ultrasound has been performed.
  - Evaluation of extent of known substernal goiter
  - Suspected airway compression (i.e., subjective sense of dyspnea or choking sensation in the clinical history with known multinodular goiter)
  - Presence of pathologic lymph nodes in cervical regions not visualized on ultrasound

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  - Clinically suspected advanced thyroid disease, including invasive primary tumor
  - Any preoperative planning for thyroid disease
- **CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260)** is also considered medically necessary for:
  - preoperative planning for individuals with substernal extension of the thyroid, pulmonary symptoms, or abnormalities on chest x-ray, and should be ordered by a surgeon or in consultation with a surgeon.
- **Thyroglossal duct cysts (TGDC)**
  - CT Neck with contrast (CPT® 70491) or MRI Neck without and with contrast (CPT® 70543) is considered medically necessary (when requested by a head and neck surgeon or by a provider in consultation with a head and neck surgeon) for EITHER of the following:
    - Pre-operative planning
    - Evaluation of a suspected recurrence

Evidence Discussion

- Ultrasound (US) plays a key role in determining which nodules display characteristics suspicious for malignancy and warrant biopsy. Of palpable thyroid nodules, the American College of Radiology (ACR) states, "US provides high-resolution imaging to show that the palpable abnormality is within the thyroid and is the best study to characterize the nodule for the risk of malignancy" (Expert Panel on Neurological Imaging et al., 2019). US is also the best study to demonstrate goiter size and evaluate thyroid morphology (Expert Panel on Neurological Imaging, 2019). US has a sensitivity of 88%, a specificity of 86%, and a diagnostic accuracy of 92% (Shi et al., 2022).
- Nuclear imaging with a radionuclide uptake and scan also plays an important role in thyroid imaging. In the setting of a suppressed thyroid stimulating hormone (TSH) level, nuclear imaging helps to determine whether the individual has thyrotoxicosis (Expert Panel on Neurological Imaging et al., 2019).
- A thyroid nuclear scan, in conjunction with thyroid ultrasound, is also useful in the setting of a multinodular goiter and a normal TSH to identify hypofunctioning or isofunctioning nodules which should be targeted for biopsy (Expert Panel on Neurological Imaging et al., 2019).
- Neck CT is useful in determining the extent of a substernal goiter, evaluating whether a goiter is causing tracheal compression or deviation, assessing the extent of invasive thyroid cancer, or for preoperative imaging. It does not have a role in distinguishing benign from malignant thyroid nodules (Expert Panel on Neurological Imaging et al., 2019).
- Neck CT is preferred to neck MRI, as there is less respiratory motion artifact (Expert Panel on Neurological Imaging et al., 2019).

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- FDG-PET/CT does not have a role in the initial imaging of a thyroid nodule (Expert Panel on Neurological Imaging et al., 2019).

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Hyperthyroidism and Hypothyroidism (Neck-8.2)

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Criteria

- Hyperthyroidism suspected
  - Thyroid Uptake Study (CPT® 78012 or CPT® 78014) if ANY of the following:
    - TSH below normal range and elevated free T4 and/or free T3, OR
    - subclinical hyperthyroidism with TSH less than 0.1 mU/L and normal free T4 and free T3, OR
    - subclinical hyperthyroidism with TSH below the lower limit of normal but greater than or equal to 0.1 and normal free T4 and free T3 in the setting of ANY of the following:
      - age greater than or equal to 65
      - symptoms of hyperthyroidism
      - presence of cardiac disease or osteoporosis
- Hyperthyroidism on therapy---For individuals with thyroid hormone levels (TSH, free T4 and free T3) within the normal, hypothyroid, or hyperthyroid range while receiving treatment with an anti-thyroid medication (methimazole or propylthiouracil/PTU):
  - Nuclear Scan (CPT® 78013 or CPT® 78014) if ONE of the following:
    - to determine the cause of hyperthyroidism if there was no diagnostic scan prior to the start of medical therapy
    - to characterize the uptake in a thyroid nodule(s) to properly triage the nodule for FNA if there was no diagnostic scan prior to the start of medical therapy
  - Thyroid Uptake Study (CPT® 78012 or CPT® 78014) if:
    - plan is for radioactive iodine therapy as definitive hyperthyroidism treatment.
- Hypothyroidism: There is no role for thyroid imaging in the workup of hypothyroidism in adults. Imaging for thyroid morphology does not help differentiate among causes of hypothyroidism, and all causes of hypothyroidism will have decreased radioiodine uptake.

Evidence Discussion

- Thyroid nuclear scans play a central role in thyroid disease evaluation. They provide a planar image of the thyroid gland using a gamma camera to assess potential variability in the concentration of the radioisotope within thyroid tissue and can be combined with measurements of uptake of specific tracers and provide very useful

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information regarding thyroid pathology and function (Expert Panel on Neurological Imaging et al., 2019).

- Imaging with a radioiodine uptake and scan provides a valuable benefit as it can help confirm the cause for thyrotoxicosis and helps to decide the most appropriate treatment, which may vary depending on cause of hyperthyroidism (Expert Panel on Neurological Imaging et al., 2019).
- Radioiodine uptake and scans can distinguish between high-uptake causes of thyrotoxicosis, such as Graves disease, toxic adenoma, and toxic multinodular goiter, and low-uptake causes, such as subacute thyroiditis (Expert Panel on Neurological Imaging et al., 2019).
- The scan component is helpful in differentiating between the high-uptake causes that show a focal uptake pattern, such as toxic adenoma or toxic multinodular goiter, and the high uptake causes that show a diffuse uptake pattern such as Graves disease (Expert Panel on Neurological Imaging et al., 2019). It is also important to note that the use of iodine-131 sodium iodide is contraindicated during pregnancy (American College of Radiology et al., 2024).
- If radioiodine therapy is planned, the uptake component of the scan can then help determine the dose (Expert Panel on Neurological Imaging et al., 2019).
- A neck ultrasound is the best imaging study to evaluate thyroid morphology and can be a helpful adjunct study to a radioiodine uptake. Although a Doppler ultrasound may help to distinguish the cause of hyperthyroidism, a radionuclide uptake study is still preferred because it directly measures thyroid activity rather than inferring it based on blood flow (Expert Panel on Neurological Imaging et al., 2019).
- When a radioactive uptake scan shows nodules from toxic multinodular goiter or toxic adenoma, a neck ultrasound can confirm presence of nodules and also evaluate for suspicious features of malignancy (Expert Panel on Neurological Imaging et al., 2019).
- Though radioactivity exposure exists with the use of radioactive scans, the studies are an invaluable resource when helping to establish the cause of hyperthyroidism and guide treatment; guidelines as to when it is appropriate to order should be followed to avoid unnecessary radiation exposure (Expert Panel on Neurological Imaging et al., 2019).
- There is no role for imaging in the workup of hypothyroidism in adults. Imaging for thyroid morphology does not help differentiate among causes of hypothyroidism, and all causes of hypothyroidism will have decreased radioiodine uptake (Expert Panel on Neurological Imaging et al., 2019).

Thyroid Health Equity Considerations

- Racial and ethnic minorities with thyroid disease have worse health outcomes for both benign and malignant disease (Chen et al., 2022).

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- Socioeconomic status, insurance status, and differential access to healthcare all contribute to disparities in health outcomes (Chen et al., 2022).

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Parathyroid Imaging (Neck-8.3)

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Criteria

- Classic primary hyperparathyroidism
  - Parathyroid Planar Imaging (CPT® 78070), Parathyroid Planar Imaging with SPECT (CPT® 78071), or Parathyroid Planar Imaging with SPECT/CT (preferred study) (CPT® 78072) AND/OR 4D CT Neck without and with contrast (CPT® 70492) are considered medically necessary if BOTH of the following criteria have been met:
    - PTH and Calcium levels are elevated
    - Intention of the study is preoperative localization
      - All parathyroid nuclear scan codes (CPT® 78070, CPT® 78071, CPT® 78072) include thyroid subtraction when performed and no additional thyroid nuclear scan CPT® codes are required unless otherwise indicated in **Thyroid Nodule (Neck-8.1)** or **Hyperthyroidism and Hypothyroidism (Neck-8.2)**.
      - Reporting or billing CPT® 78800 for the purpose of intraoperative parathyroid localization using a gamma probe is considered not medically necessary if performed along with a parathyroid nuclear scan (CPT® 78070, CPT® 78071, CPT® 78072).
      - 3D Imaging (CPT® 76376 or CPT® 76377) is considered medically necessary with a 4D CT Neck.
  - MRI Neck without and with contrast (CPT® 70543) is considered medically necessary for cases of re-operation, difficult localization or ionizing radiation contraindication as ordered by an Endocrinologist, Parathyroid surgeon, or Radiologist or any provider in consultation with one of these specialists.
  - CT Chest with contrast (CPT® 71260) is considered medically necessary for the evaluation of ectopic mediastinal parathyroid adenomas as ordered by an Endocrinologist, Parathyroid surgeon, or Radiologist or any provider in consultation with one of these specialists.
  - Choline PET/CT (CPT® 78815 or CPT® 78816) is considered experimental, investigational, or unproven for preoperative localization in cases of primary hyperparathyroidism.
  - Repeat imaging is considered medically necessary (when ordered by a surgeon with expertise in parathyroidectomy or by a provider in consultation with such a surgeon) for EITHER of the following:
    - Prior non-localizing imaging and no prior parathyroid exploration
    - Persistent or recurrent hyperparathyroidism after parathyroid surgery

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- Primary hyperparathyroidism variants
  - Primary hyperparathyroidism with non-elevated serum calcium (serum calcium level normal and PTH elevated)
    - Confirmatory study is elevated ionized calcium, elevated albumin corrected calcium or elevated historic calcium levels.
  - Hypercalcemia with inappropriately non-suppressed PTH (calcium level elevated and PTH normal)
    - PTH level greater than or equal to 25 pg/mL is consistent with primary hyperparathyroidism.
  - Intention of parathyroid imaging should be for pre-operative localization.
  - Use the same guidance on imaging modalities as described in classic primary hyperparathyroidism.

    Primary Hyperparathyroidism variants:

Primary Hyperparathyroidism Variant	Calcium	PTH	Confirms/strongly suggests primary hyperparathyroidism
Classic primary hyperparathyroidism	High	High	Yes
Primary hyperparathyroidism with non-elevated serum calcium	Normal	High	Elevated ionized albumin corrected or historic calcium levels*
Hypercalcemia with inappropriately non-suppressed PTH	High	Normal	PTH greater than or equal to 25 pg/ml

- Normocalcemic hyperparathyroidism
  - Serum calcium levels (including ionized calcium levels) are always normal and PTH levels are elevated.
  - Secondary causes of PTH elevation are excluded.
  - Calcium, PTH and clinical status should be monitored annually.
    - In the event of laboratory progression to hypercalcemia, refer to classic primary hyperparathyroidism for imaging guidance.
    - In the event of clinical progression (decline in bone mineral density or new fracture/renal stone/nephrocalcinosis), imaging as noted above for classic primary hyperparathyroidism for the intent of preoperative localization is

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considered medically necessary after consultation with a specialist or any provider in consultation with a specialist.

- Secondary renal hyperparathyroidism
  - Serum calcium levels are low or normal (but may also be elevated in more advanced disease) and PTH levels are very elevated.
  - Imaging as noted above for classic primary hyperparathyroidism for the intent of preoperative localization is considered medically necessary after consultation with a specialist if all of the following are met:
    - Individual has stage 3a-stage 5 chronic kidney disease (GFR less than 60).
    - PTH level is greater than 9x upper limit of normal reference range for the lab testing facility (~585 pg/mL) despite standard medical or pharmacologic therapy (calcimimetics, calcitriol and/or vitamin D analogs).
- Tertiary hyperparathyroidism
  - Serum calcium and PTH levels are elevated as a result of long standing secondary hyperparathyroidism in individuals on renal replacement therapy or after renal transplant.
  - Imaging as noted above for classic primary hyperparathyroidism for the intent of preoperative localization is considered medically necessary after consultation with a specialist or any provider in consultation with a specialist.

Hyperparathyroidism subtypes:

Hyperparathyroidism Subtype	Calcium	PTH	Clinical Hallmarks
Normocalcemic Hyperparathyroidism	Normal	High	Calcium never elevated
Secondary Renal Hyperparathyroidism	Low/Normal/High	Very High	Stage 3a-5 CKD, PTH greater than 9x ULN
Tertiary Hyperparathyroidism	High	High	ESRD/renal transplant

Evidence Discussion

- The purpose of parathyroid imaging is to aid in localizing hyperfunctioning parathyroid gland(s) for the purpose of curative surgery. Imaging has no role in the diagnosis of hyperparathyroidism (Wilhelm et al., 2016).
- There may be a need for more than one modality in the localization of a parathyroid adenoma as studies have shown no one modality is superior over others (Wilhelm et al., 2016).

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- The sensitivity and positive predictive value of imaging modalities will vary in different situations, such as whether the individual has a single parathyroid adenoma or if multiple parathyroid glands are involved, if the imaging is for an initial surgical intervention versus a re-operation, and whether the individual has primary, secondary, or tertiary hyperparathyroidism (Wilhelm et al., 2016).

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Parathyroid Incidentaloma (Neck-8.4)

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Criteria

- A mass incidentally found on neck imaging that may represent an enlarged parathyroid gland should prompt laboratory testing including calcium and PTH levels.
  - If laboratory abnormalities suggest hyperparathyroidism, i.e., "functioning parathyroid incidentaloma", see **Hyperparathyroidism (NECK-8.3)** for imaging recommendations.
  - If there are no laboratory abnormalities and diagnoses other than parathyroid incidentaloma are suspected, see **Neck Mass/Swelling/Adenopathy (NECK-5.1)** for imaging recommendations.
  - Parathyroid nuclear scans are commonly requested for an evaluation of a parathyroid incidentaloma; however, the sensitivity of these scans are low in individuals with normal calcium/PTH and no clinical symptoms of primary hyperparathyroidism. Reliance on either a positive scan or negative scan to decide if surgery is considered medically necessary is not supported by current literature.
- If a parathyroid incidentaloma is suspected on imaging prior to planned thyroid surgery or other head/neck surgery, the following studies are considered medically necessary if ordered by the surgical team or any provider in consultation with the surgical team:
  - Parathyroid Planar Imaging (CPT® 78070), Parathyroid Planar Imaging with SPECT (CPT® 78071), or Parathyroid Planar Imaging with SPECT/CT (CPT® 78072) AND/OR 4D CT Neck without and with contrast (CPT® 70492)

Evidence Discussion

- With the advent of high resolution CT scans, ultrasounds, and other imaging modalities, along with their widespread use as diagnostic modalities, parathyroid lesions are increasingly being incidentally found on these imaging studies (Patel et al., 2020).
- The distinct features of parathyroid lesions are readily seen on ultrasound imaging (Patel et al., 2020).
- If lab work does not indicate hyperfunctioning of the parathyroid gland, then these lesions can be monitored annually with ultrasound, as parathyroid nuclear scans have low sensitivity for detection in individuals with normal parathyroid function (Patel et al, 2020).
- Parathyroid nuclear scans, 4D CT of the Neck, and Neck ultrasound studies can be used in evaluation of parathyroid incidentalomas found prior to a pending neck

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surgery to aid in preoperative evaluation, as determined by the surgical team (Patel et al., 2020).

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Imaging of the Larynx, Trachea, and Bronchus (Neck-9)

Guideline

Imaging of the Larynx, Trachea, and Bronchus (Neck-9.1)
References (Neck-9)

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Imaging of the Larynx, Trachea, and Bronchus (Neck-9.1)

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Criteria

- Initial evaluation for suspected laryngotracheal pathology:
  - Direct visualization of the upper airway (via laryngoscopy, with or without bronchoscopy)
- To further evaluate abnormalities found on direct visualization, including laryngotracheal, tracheal, or bronchial anomalies, foreign bodies or persistent segmental or lobar lung collapse:
  - CT Neck with contrast (CPT® 70491) **OR** CT Neck without contrast (CPT® 70490) **AND/OR**
  - CT Chest with contrast (CPT® 71260) **OR** CT Chest without contrast (CPT® 71250), depending on the anatomic level of the lesion.
  - If requested, 3-D reconstruction (CPT® 76377 or CPT® 76376) is considered medically necessary in the evaluation of a known or suspected foreign body.
    - MRI Orbit/Face/Neck without contrast (CPT® 70540) OR MRI Neck without and with contrast (CPT® 70543) is considered medically necessary as a supplement to CT Neck or CT Chest if additional assessment is needed.
    - See **Squamous Cell Carcinomas of the Head and Neck—Suspected/ Diagnosis (ONC-3.1)** for suspected laryngotracheal tumor.
- For suspected subglottic stenosis (SGS) after evaluation by a specialist or in consultation with a specialist who has directly visualized the upper airway:
  - CT Neck with contrast (CPT® 70491) **OR** CT Neck without contrast (CPT® 70490) is considered medically necessary.
- For obstructive physiology in the setting of tracheomalacia:
  - Expiratory HRCT (CPT® 71250) is considered medically necessary.

Evidence Discussion

- Radiographs by means of neck and chest radiographs are sensitive for only those radioopaque foreign bodies but have value in providing information regarding other chest pathology such as presence of consolidation, atelectasis and bronchiectasis (Kara et al., 2024).
- CT is more sensitive than x ray in identifying airway foreign bodies due to its higher resolution (Liu et al., 2022).

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- CT scan can rapidly and accurately identify laryngo-tracheo-bronchial abnormalities prior to bronchoscopy such as pneumonia, airway stenosis, atelectasis, effusion and consolidation (Liu et al., 2022; Abdel Razek, 2016; Wallis et al., 2019).
- CT provides a sensitivity of more than 96% and a specificity of more than 97% in comparison to bronchoscopy for detecting tracheomalacia. CT provides the advantage of simultaneously evaluating mediastinal, vascular and lung pathologies (McCullagh et al., 2022).
- According to a 2022 review by Pasick et al., "spiral computed tomography (CT) with multiplanar reformatting and virtual endoscopy has proven comparable to rigid bronchoscopy with a 100% sensitivity and 100% specificity of detecting SGS.The length and grade of stenosis as well as measurements of proximal and distal airway are accurate on CT".

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Neck Pain/Neck Trauma (Neck-10)

Guideline

Neck Pain (Cervical) (Neck-10.1)
Torticollis and Dystonia (Neck-10.2)
Eagle Syndrome (Neck-10.3)
Neck Trauma (Neck-10.4)
References (Neck-10)

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Neck Pain (Cervical) (Neck-10.1)

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- Neck pain is usually related to a specific process and therefore, found elsewhere in these guidelines.
  - For the evaluation of neck pain or other symptoms which may involve the cervical spine, including myelopathy and cervical radiculopathy, see the Spine Imaging Guidelines.
  - For evaluation of neck pain related to sore throat/pharygitis, see **Sore Throat/ Throat Pain/Odynophagia (Neck-12.1)**.
  - For evaluation of neck pain related to cervical adenopathy or neck mass, see **Neck Mass/Swelling/Adenopathy (Neck-5.1)**.
  - For evaluation of neck pain related to carotid dissection or vascular concerns, see **Cerebrovascular and Carotid Disease - Initial Imaging (PVD-3.1)**.
  - For evaluation of neck pain related to torticollis, see **Torticollis and Dystonia (Neck-10.2)**.

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Torticollis and Dystonia (Neck-10.2)

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Criteria

Older Child (beyond infancy) or Adult

- Initial evaluation with history of trauma, and low suspicion of injury:
  - Plain radiographs of the cervical spine are considered medically necessary.
    - To identify fracture or malalignment if plain radiographs are inconclusive or in individuals with a high-risk mechanism of cervical spine injury within the last 3 months (see below**):
      - CT Neck with contrast (CPT® 70491) **AND/OR**
      - CT Cervical Spine without contrast (CPT® 72125) is considered medically necessary.
- In the clinical setting of cervical spine trauma with an associated neurologic deficit:
  - MRI Cervical Spine without contrast (CPT® 72141) is considered medically necessary.
- In the absence of trauma, to identify underlying abscess, bony, muscular, vascular, or neurological causes, ONE of the following is considered medically necessary:
  - CT Neck with contrast (CPT® 70491), **OR**
  - CT Cervical Spine without contrast (CPT® 72125), **OR**
  - MRI Cervical Spine without contrast (CPT® 72141), **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543), **OR**
  - MRA Neck without and with contrast (CPT® 70549)
    - Positive→ Further advanced imaging is considered not medically necessary if a local cause has been identified.
    - Negative→ MRI Brain without and with contrast (CPT® 70553) is considered medically necessary to exclude CNS cause.

**High-risk mechanisms of cervical spine injury may include:
- Head trauma and/or maxillofacial trauma
- Pedestrian in a motor vehicle accident
- Fall from above standing height
- Diving accident
- Head-on motor vehicle collision without/with airbag deployment
- Rollover motor vehicle collision
- Ejection from the vehicle in a motor vehicle collision

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- High speed of the vehicle at the time of collision
- Not wearing a seatbelt/shoulder harness in a motor vehicle collision
- Individuals with ankylosing spondylitis are at high-risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriparesis/quadriplegia

Evidence Discussion

- Per the American College of Radiology et al. (2022), CT offers superior evaluation of the bony structures of the spine.
- Individuals with abnormal neurological findings benefit from MRI to help identify spinal cord abnormalities and soft tissue causes in the workup of dystonia and/or torticollis (Beckmann et al., 2019).
- Risks associated with imaging include, but are not limited to, radiation exposure and contrast complications (Beckmann et al., 2019).
- Torticollis is an abnormal twisting of the neck in which the head is rotated or twisted. Causes are variable and may be congenital or acquired (caused by trauma, juvenile idiopathic arthritis, neoplasm, etc.) (Haque et al., 2012).

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Eagle Syndrome (Neck-10.3)

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Also known as "calcified stylohyoid ligament", "elongation of styloid process", or "stylocarotid artery syndrome".

Criteria

- **Eagle Syndrome**
  - If Eagle Syndrome is suspected on exam and/or lateral neck x-ray:
    - CT Maxillofacial with contrast (CPT® 70487) **OR** CT Maxillofacial without contrast (CPT® 70486) **AND/OR**
    - CT Neck with contrast (CPT® 70491) **OR** CT Neck without contrast (CPT® 70490)
    - CTA/CTV (CPT® 70498) is also considered medically necessary to assess for concerns of vascular compression. See also **General Guidelines - CT and MR Angiography (CTA and MRA) (HD-1.5)** and **General Guidelines – Other Imaging Situations (HD-1.7).**
- 3-D rendering (CPT® 76376 or CPT® 76377) is considered medically necessary as an add on to CT Neck (CPT® 70491 **or** CPT® 70490), if requested, for accurate evaluation of the styloid process in relation to its anatomic relationship with the other head and neck structures, in surgical planning. See **3D Rendering (Preface-4.1)**.

Background and Supporting Information

- Eagle syndrome is typically seen in individuals after pharyngeal trauma or tonsillectomy (Swanson et al., 2023).
- Eagle syndrome is characterized by recurrent pain in the oropharynx, face, and neck as a result of an elongated styloid process or calcified stylohyoid ligament (Jalisi et al., 2017).
- The pain is typically pharngeal and may be referred to the ear. There may also be a variety of other symptoms which include, but are not limited to a sensation of a foreign body in the throat, odynophagia, or cervicofacial pain (Swanson et al., 2023).
- Impingement upon structures near the styloid process, such as the internal carotid artery, internal jugular vein, or cranial nerve(s), may cause symptoms such as tinnitus and headache (Swanson, et al., 2023)
- CTA/CTV is used when there is a concern for vascular compression which can lead to a dissection of the carotid artery, or intracranial hypertension in cases of a compressed internal jugular vein (Liu et al., 2025). CTA in these instances is beneficial because it "...more accurately delineates the three-dimensional spatial

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relationship between the styloid process and the ICA [internal carotid artery]...and helps judge luminal deformation or dissection" (Liu et al., 2025).

Evidence Discussion

- CT is the preferred modality for evaluation of bony structures and detection of abnormalities associated with calcifications (Swanson et al., 2023).
- Indications for cervicocerebral computed tomography angiography (CTA) or magnetic resonance angiography (MRA) of the head and neck vessels include the diagnosis, characterization and/or surveillance of a variety of vascular conditions, including vascular compression of the internal or external carotid artery by an elongated styloid process (Eagle Syndrome) (American College of Radiology et al., 2025b).
- Risks of CTA include exposure to ionizing radiation; thus, magnetic resonance angiography (MRA) is available as an alternative to reduce radiation exposure. In addition, MRA is an alternative for individuals with iodinated contrast allergies or other contraindications to iodinated contrast (American College of Radiology et al., 2025a; Lind & Do-Nguyen, 2021).
- MRA, as an alternative modality, is noninvasive, and does not require iodinated contrast. Limitations include artifacts due to motion, slow or turbulent flow, susceptibility effects, and claustrophobia. Additionally, MRA may not be a feasible option for those with contraindications to MRI such as incompatible pacemakers, cochlear implants, neurostimulators or other devices. In these scenarios, CTA may be the appropriate alternative (American College of Radiology et al., 2025a; Lind & Do-Nguyen, 2021; Loss et al., 2025).

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Neck Trauma (Neck-10.4)

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Criteria

- CT Neck with contrast (CPT® 70491) OR CT Neck without contrast (CPT® 70490) is considered medically necessary in individuals with neck trauma who have an altered state of consciousness, distracting injuries or intoxication, midline tenderness to palpation, laryngeal trauma, or neurological deficits.
- Penetrating neck trauma
  - CTA Neck (CPT® 70498) is considered medically necessary for evaluating vascular injury and/or aerodigestive injuries.
- Blunt neck trauma
  - For any evidence of blunt neck trauma, including but not limited to: neurologic deficit, infarction on CT Head, cervical seatbelt sign, and fractures of the skull, face, or spine, a CTA Neck (CPT® 70498) is considered medically necessary.
  - If CTA is negative but high clinical suspicion remains for esophageal injury, MRA Neck with contrast (CPT® 70548) OR MRA Neck without contrast (CPT® 70547) OR MRA Neck without and with contrast (CPT® 70549) is considered medically necessary.

Evidence Discussion

- CTA has high sensitivity and specificity for stable individuals with penetrating neck trauma (Ibraheem et al., 2020.
- CTA is the primary imaging modality to assess aerodigestive injuries from penetrating neck trauma. However, a high number of esophageal injuries are missed on CTA, so a negative CTA with suspicion for esophageal injury warrants additional testing (Siletz & Inaba, 2024; Paladino et al., 2021).
- MRA Neck can be useful to detect dissections and intramural hematoma from blunt neck trauma (Abu et al., 2020).
- CT Neck without contrast is useful to assess laryngeal neck trauma, as it can assess the cartilaginous and bony components, as well as determine any fractures that may need stabilization (Malvi & Jain, 2022).

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Salivary Gland Disorders (Neck-11)

Guideline

Salivary Gland Disorders (Neck-11.1)
References (Neck-11)

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Salivary Gland Disorders (Neck-11.1)

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Criteria

- **Xerostomia (Dry Mouth)**
  - Salivary Gland Nuclear Imaging (one of CPT® 78230, CPT® 78231, or CPT® 78232) is considered medically necessary for dry mouth and any one of the following:
    - Sjögren's syndrome
    - Sialadenitis
    - History of head or neck radiation therapy
    - History of cerebral palsy
    - Parotid mass to allow preoperative diagnosis of Warthin's tumor
- **Salivary Gland Stones, Sialadenitis or Stenosis**:
  - Sialography (contrast dye injection) under fluoroscopy is considered medically necessary to rule out a salivary duct stone or stricture, using
    - Post-sialography CT (CT Maxillofacial without contrast [CPT® 70486] for Stensen's duct of the parotid gland, which would be most common; **or** CT Neck without contrast [CPT® 70490] for the level of the Wharton's Duct); **or** post-sialography MRI (MRI Orbit/Face/Neck without contrast [CPT® 70540]) **OR**
  - CT Maxillofacial area with contrast (CPT® 70487) **OR**
  - CT Neck with contrast (CPT® 70491)
    - CT performed only without IV contrast (CPT® 70490) may be helpful in a small minority of cases, such as cases of follow-up for known salivary stones, or for post-sialography imaging, as described above **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543)
- **Parotid or Other Salivary Gland Mass**
  - Either of the following are considered medically necessary:
    - MRI Orbit/Face/Neck without and with contrast preferred (CPT® 70543) **or** MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
    - CT Neck with contrast (CPT® 70491) preferred **or** CT Maxillofacial area with contrast (CPT® 70487)
- **Repeat Imaging (CT or MRI, as above)**
  - Repeat advanced imaging, as requested by the surgeon or those in consultation with the surgical team, is considered medically necessary if relevant history and exam demonstrate symptoms or signs concerning for:
    - complications of surgery, or

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- recurrence or progression of neoplasm/lesion.

Evidence Discussion

- Current history and comprehensive head & neck exam are required prior to any advanced imaging for suspected salivary gland pathology (Kim et al., 2024; Moore et al., 2023).
- A recent study in the American Journal of Neuroradiology comparing contrast enhanced and non-contrast enhanced CT in the evaluation of sialolithiasis demonstrated excellent sensitivity and specificity with no false-positive results using contrast-enhanced CT alone (without the addition of non-contrasted images for comparison) (Purcell et al., 2017). The sensitivity of contrast-enhanced CT is 96-98%, and the specificity is 88-100% (Kim et al., 2024). Benefits of initial only contrast-enhanced CT include better evaluation of the ductal system, improved soft tissue contrast in assessing salivary masses and decreased radiation dose (compared to dual phase CT imaging (without and with IV contrast)) (Purcell et al., 2017).
- CT and MRI are both useful in the evaluation of salivary gland tumors. Both have unique advantages. CT is better than MRI at evaluating bone erosion from malignant tumors as well as looking for stones in the glands or ducts (Grace et al.,2025). MRI is better at evaluating the soft tissue and can be helpful in determining the extent of disease and deep space involvement (Kuang et al., 2025).

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Sore Throat, Odynophagia, and Hoarseness (Neck-12)

Guideline

Sore Throat/Throat Pain/Odynophagia (Neck-12.1)
Hoarseness (Neck-12.2)
References (Neck-12)

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Sore Throat/Throat Pain/Odynophagia (Neck-12.1)

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Criteria

- See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)** for dysphagia as the primary symptom.
- Sore Throat/Throat Pain/Odynophagia
  - Uncomplicated viral or streptococcal pharyngitis with sore throat:
    - Imaging studies are considered not medically necessary. See **Neck Mass/ Swelling/Adenopathy (Neck-5.1)** for suspected complications of pharyngitis/ tonsillitis, such as a cervical space abscess.
  - Postoperative throat pain or odynophagia after head and neck procedure with suspected complication of procedure:
    - CT Neck with contrast (CPT® 70491)
  - Sore throat/throat pain/odynophagia that is persistent or progressive for two or more weeks in spite of any treatment measures or observation:
    - Initial evaluation is laryngoscopy
      - If the initial laryngoscopy is abnormal, or if it is negative, and if there is a continued concern for an occult lesion within the pharynx due to any red flag symptoms (weight loss, referred otalgia, hoarseness, hemoptysis, and/or unilateral presentation of symptoms):
        - CT Neck with contrast (CPT® 70491) **OR**
        - MRI Orbit/Face/Neck without and with contrast (CPT® 70543)
      - If subjective dysphagia AND odynophagia are both present and the initial laryngoscopy and neck exam are normal (i.e., no cervical space abscess or post-surgical complication is suspected), and no red flag symptoms are present, then barium esophagram (or GI upper endoscopy) is considered medically necessary prior to the advanced imaging studies of the neck listed above.

Background and Supporting Information

- Odynophagia – Painful swallowing (Expert Panel on Gastrointestinal Imaging et al., 2019)

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Evidence Discussion

- Both CT and MRI can be used to delineate masses and provide cross sectional visualization of lesions that are deep to the mucosal surface. CT has the advantage to being readily available, requiring less time and less expense when compared to MRI (Rahim et al., 2023; McCormack & Nicewicz, 2022).

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Hoarseness (Neck-12.2)

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Criteria

- Laryngoscopy is the primary diagnostic modality for evaluating individuals with hoarseness. Imaging studies, including CT and MRI, are considered not medically necessary in most individuals with hoarseness because most hoarseness is self-limited or caused by pathology that can be identified by laryngoscopy alone.
- The need for advanced imaging is based upon abnormal findings upon laryngoscopy, such as:
  - Immobile or partially mobile vocal cord [see **Recurrent Laryngeal Nerve Palsy (NECK-7.1)**]
  - Any growth, asymmetry, ulceration, or other suspected neoplasm of the glottis or supraglottis [see **Neck Mass/Swelling/Adenopathy (Neck 5.1)**; see also **ONC-3.0-3.4**].

Background and Supporting Information

- Hoarseness – A change in voice quality reported by the individual (Stachler et al., 2018)

Evidence Discussion

- An evaluation of an individual with hoarseness should include a complete exam of the head and neck (Stachler et al., 2018). According to Stachler et al. (2018), "...most dysphonia is self-limited and related to upper respiratory tract infection, which usually resolves in 7 to 10 days regardless of treatment". Laryngoscopy is an important diagnostic tool in the evaluation of hoarseness by identifying any possible underlying pathological cause (Stachler et al., 2018).

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Procedure Codes Associated with General Neck Imaging

Guideline

Procedure Codes Associated with General Neck Imaging

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Procedure Codes Associated with General Neck Imaging

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The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Description
70486	Computed tomography, maxillofacial area; without contrast material
70487	Computed tomography, maxillofacial area; with contrast material(s)
70490	Computed tomography, soft tissue neck; without contrast material
70491	Computed tomography, soft tissue neck; with contrast material(s)
70492	Computed tomography, soft tissue neck; without contrast material followed by contrast material(s) and further sections
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70540	Magnetic resonance (eg, proton) imaging, orbit, face, and/or neck; without contrast material(s)
70543	Magnetic resonance (eg, proton) imaging, orbit, face, and/or neck; without contrast material(s), followed by contrast material(s) and further sequences
70547	Magnetic resonance angiography, neck; without contrast material(s)
70548	Magnetic resonance angiography, neck; with contrast material(s)
70549	Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences
70551	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material
70553	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material, followed by contrast material(s) and further sequences
71250	Computed tomography, thorax, diagnostic; without contrast material

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Code	Description
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71270	Computed tomography, thorax, diagnostic; without contrast material, followed by contrast material(s) and further sections
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71550	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s)
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
72125	Computed tomography, cervical spine; without contrast material
72141	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; without contrast material
74160	Computed tomography, abdomen; with contrast material(s)
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
78012	Thyroid uptake, single or multiple quantitative measurement(s) (including stimulation, suppression, or discharge, when performed)
78013	Thyroid imaging (including vascular flow, when performed)
78014	Thyroid imaging (including vascular flow, when performed); with single or multiple uptake(s) quantitative measurement(s) (including stimulation, suppression, or discharge, when performed)
78070	Parathyroid planar imaging (including subtraction, when performed)

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Code	Description
78071	Parathyroid planar imaging (including subtraction, when performed); with tomographic (SPECT)
78072	Parathyroid planar imaging (including subtraction, when performed); with tomographic (SPECT), and concurrently acquired computed tomography (CT) for anatomical localization
78230	Salivary gland imaging
78231	Salivary gland imaging; with serial images
78232	Salivary gland function study
78800	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh
78816	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; whole body
78264	Gastric emptying study

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General Criteria (ONC-1)

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Abbreviations for Oncology Imaging Guidelines

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Abbreviations for Oncology Imaging Guidelines	
ACTH	adrenocorticotropic hormone
AFP	alpha-fetoprotein
ALKP	alkaline phosphatase
AP	anteroposterior
betaHCG	beta human chorionic gonadotropin
CA 125	cancer antigen 125 test
CA 19-9	cancer antigen 19-9
CA 15-3	cancer antigen 15-3
CA 27-29	cancer antigen 27-29
CBC	complete blood count
CEA	carcinoembryonic antigen
CNS	central nervous system
CR	complete response
CTA	computed tomography angiography
DCIS	ductal carcinoma in situ
DLBCL	diffuse large B cell lymphomas
DRE	digital rectal exam
EGD	esophagogastroduodenoscopy
ENT	ear, nose, throat
EOT	end of therapy
ERCP	endoscopic retrograde cholangiopancreatography
ESR	erythrocyte sedimentation rate

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Abbreviations for Oncology Imaging Guidelines	
EUA	exam under anesthesia
EUS	endoscopic ultrasound
FDG	fluorodeoxyglucose
FNA	fine needle aspiration
FUO	fever of unknown origin
GE	gastroesophageal
GI	gastrointestinal
GU	genitourinary
GTR	gross total resection
HG	high-grade
HIV	human immunodeficiency disease
HRPC	hormone refractory prostate cancer
hypermet	hypermetabolic
IFRT	involved field radiation therapy
inv	invasive
LAR	low anterior resection
LCIS	lobular carcinoma in situ
LDH	lactate dehydrogenase
LFT	liver function tests
LND	lymph node dissection
LVI	lymphovascular invasion
MALT	mucosa associated lymphoid tissue
maint	maintenance
MEN	multiple endocrine neoplasia
MG	myasthenia gravis
MGUS	monoclonal gammopathy of unknown significance
MIBG	I-123 metaiodobenzylguanidine scintigraphy

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Abbreviations for Oncology Imaging Guidelines	
MRA	magnetic resonance angiography
MRCP	magnetic resonance cholangiopancreatography
MRI	magnetic resonance imaging
MUGA	'multiple gated acquisition' cardiac nuclear scan
MWA	microwave ablation
NaF	sodium fluoride
NET	neuroendocrine tumor
NCCN®	National Comprehensive Cancer Network
NHL	non-Hodgkin's lymphoma
NPC	nasopharyngeal carcinoma
NSABP	National Surgical Adjuvant Breast and Bowel Project
NSAIDS	nonsteroidal anti-inflammatory drugs
NSCLC	non-small cell lung cancer
NSGCT	non-seminomatous germ cell tumor
PA	posteroanterior
PCI	prophylactic cranial irradiation
PET	positron emission tomography
COG	Children's Oncology Group
PSA	prostate specific antigen
RFA	radiofrequency ablation
RPLND	retroperitoneal lymph node dissection
SqCCa	squamous cell carcinoma
SCLC	small cell lung cancer
SIADH	syndrome of inappropriate secretion of antidiuretic hormone
TCC	transitional cell carcinoma
TLH	total laparoscopic hysterectomy
TNM	tumor node metastasis staging system

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Abbreviations for Oncology Imaging Guidelines	
TSH	thyroid-stimulating hormone
TURBT	trans-urethral resection of bladder tumor
VIPoma	vasoactive intestinal polypeptide
WLE	wide local incision
WB-MRI	whole body MRI
WM	Waldenstrom's macroglobulinemia
WBXRT	whole brain radiation therapy

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General Criteria (ONC-1.0)

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General Criteria

- A relevant clinical evaluation or meaningful contact (telephone call, electronic mail or messaging) should be performed prior to considering advanced imaging, unless the individual is undergoing guideline-supported scheduled off therapy surveillance evaluation or cancer screening. The clinical evaluation may include a relevant history and physical examination, including biopsy, appropriate laboratory studies, and results of non-advanced or advanced imaging modalities.
- Unless otherwise stated in the disease-specific guideline, a histological confirmation of malignancy (or recurrence) and the stage of disease is required to perform a medical necessity review of the requested imaging.
- Generally, the studies listed in the disease-specific sections reflect the studies supported by current literature and research for that condition. If a study is not listed, then it is not considered medically necessary.
- Routine imaging of brain, spine, neck, chest, abdomen, pelvis, bones, or other body areas is not considered medically necessary except where explicitly stated in a diagnosis-specific guideline section, or if one of the following applies:
  - known prior disease involving the requested body area
  - new or worsening symptoms or physical exam findings involving the requested body area (including non-specific findings such as ascites or pleural effusion)
  - new finding on basic imaging study such as plain x-ray or ultrasound
  - new finding on adjacent body area CT/MRI study (e.g.,, pleural effusion observed on CT Abdomen)
- Unless otherwise stated in the disease-specific guideline, advanced imaging of asymptomatic individuals is not routinely considered medically necessary without signs or symptoms of systemic involvement of cancer.
- Repeat imaging studies are not generally considered medically necessary unless there is evidence of disease progression, recurrence of disease, and/or the repeat imaging will affect an individual's clinical management.
- Conventional imaging performed prior to diagnosis should not be repeated unless there is a delay of at least 6 weeks since previous imaging and treatment initiation or there are new or significantly worsening clinical signs or symptoms.
- If an individual is late for a specified imaging, the imaging may be approved late. However, the interval between the late imaging and the subsequent imaging must adhere to the interval in the disease-specific guidelines.

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Phases of Oncology Imaging and General Phase-Related Criteria

The following provides general clarity regarding the categories used to describe the phases of imaging throughout these guidelines.

- Screening
  - imaging requested for individuals at increased risk for a particular cancer in the absence of known clinical signs or symptoms
- Suspected diagnosis
  - imaging requested to evaluate a suspicion of cancer, prior to histological confirmation
- Initial work-up and staging
  - imaging requested after biopsy confirmation and prior to starting specific treatment
- Treatment response
  - imaging performed during active treatment with chemotherapy, targeted therapy, immunotherapy, radiation therapy, or endocrine therapy. Can be curative or non-curative.
- Restaging of locally treated lesions
  - imaging performed to evaluate response to primary or metastatic lesion(s) following lesion directed therapy (e.g., cryotherapy, ablation, radioembolization, chemoembolization, radiation therapy)
- Restaging/suspected recurrence
  - imaging requested when there is suspicion for progression or recurrence of known cancer based on clinical signs or symptoms, laboratory tests, or basic imaging studies
- Surveillance
  - imaging performed in individuals who are asymptomatic or have chronic stable symptoms, have no clinical suspicion of change in disease status, and are not receiving active anti-tumor treatment or are receiving maintenance treatment
  - In malignancies that support post-operative imaging through Restaging/ Recurrence or Surveillance guidelines, imaging interval is determined using both parameters. Surveillance imaging should be done using date of post-operative imaging. If post-operative imaging was not done, use most appropriate guideline.

The table below provides descriptions of treatment phases, their definitions, and general timeframes.

Treatment Phase	Phase Definition	Imaging Timeframe
After definitive local therapy of primary tumor	Treatment intended to be curative typically using a combination of surgery, radiation therapy, and chemotherapy	Follow surveillance guidelines

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Treatment Phase	Phase Definition	Imaging Timeframe
During/after neoadjuvant chemotherapy	Treatment given prior to definitive intended curative therapy (usually surgery and/or radiation therapy based), to shrink the cancer to make the definitive curative therapy more effective	Follow initial work-up/staging or restaging/recurrence guidelines
During adjuvant chemotherapy	Adjuvant is given after the primary cancer treatment (primary treatment is usually surgery or radiation) with the goal of destroying any remaining cancer cells that cannot be visualized but may still be present, to reduce the risk of recurrence and improve cure/ survival rates beyond initial curative treatments (e.g., colorectal, breast)	Follow surveillance guidelines
After ablative therapy	Minimally invasive medical procedure that destroys abnormal tissue (cancer cells) using heat, cold or other methods, often used as an alternative to surgery or in conjunction with other treatments. Ablative therapy can be considered curative or palliative depending on numerous factors such as other sites of disease, cancer subtype, and ablative technique used.	See disease-specific guidelines

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Treatment Phase	Phase Definition	Imaging Timeframe
Chemotherapy or immunotherapy for active disease	• Measurable disease: Cancerous lesions that can be accurately measured in size to allow for assessment of tumor response. Solid lesions need to be 1cm or greater while lymph nodes should be 1.5cm or greater (short axis) • Non-measurable active disease: Lesions that cannot be accurately measured based on size (see above) in addition to lesions such as bone, pleural effusions, ascites, and carcinomatosis • Active disease: Cancer thought to be "active" whether it is measurable or non-measurable. For lesions that are not clear (i.e., due to small size, chronically stable, not proven to be malignant), provider discretion is to be used to include modality.	Every 2 cycles (generally every 6 to 8 weeks)
During endocrine/ hormonal therapy alone for active disease	E.g., tamoxifen, letrozole, anastrozole, exemestane	Every 3 months (12 weeks)
Active disease on maintenance therapy	Maintenance therapy is given to help keep cancer from coming back after it has shrunk or disappeared following initial therapy and may be given for a finite or indefinite timeframe	See disease-specific guidelines
Active metastatic disease being monitored off therapy		Every 3 months (12 weeks)

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Treatment Phase	Phase Definition	Imaging Timeframe
Metastatic disease in complete response on or off therapy	Defined as all measurable and non-measurable disease has disappeared (to include normalized tumor markers if applicable) and rarely translates into cure but remission can be sustained for years	• Once complete remission (CR) has been achieved, frequency of imaging should be no sooner than every 3 months and continue for up to 5 years from the time of CR • Follow surveillance guidelines
Metastatic disease in complete response due to definitive treatment (surgery, XRT, ablation) agnostic to histology	Defined as all measurable disease has been definitively removed/treated but individual is not considered cured	See disease-specific guideline; if not in guideline, determined on a case-by-case basis.
Metastatic disease in definitive remission after curative therapy (surgery, radiation, ablation)	Defined as metastatic disease (isolated/oligometastatic) that has been able to undergo definitive therapy of all sites of disease with intention of cure and no current signs or symptoms of active cancer	See disease-specific guideline

General Criteria

- Advanced imaging is not considered medically necessary for evaluation of in situ or non-invasive cancers or cancer surveillance after complete surgical removal of primary disease unless otherwise stated in the cancer-specific guidelines.
- Advanced imaging is not considered medically necessary for monitoring disease in individuals who choose to not receive standard oncologic therapy but may be receiving alternative therapies or palliative care and/or hospice. All advanced imaging considered medically necessary for initial staging of the specific cancer type can be approved once when the individual is considering initiation of a standard therapeutic approach (surgery, chemotherapy, or radiation therapy).
- Brain imaging is performed for signs or symptoms of brain disease
  - MRI Brain without and with contrast (CPT® 70553) is the recommended study for evaluation of suspected or known brain metastases. If a non-contrast CT head

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shows suspicious lesion, MRI Brain is considered medically necessary to further characterize the lesion.
  - CT without and with contrast (CPT® 70470) is considered medically necessary when MRI is contraindicated or not available, or if there is skull bone involvement.
  - Certain malignancies including, but not limited to, melanoma and lung cancer have indications for brain imaging for asymptomatic individuals.
  - If stage IV disease is demonstrated elsewhere or if systemic disease progression is noted, refer to disease specific guidelines.
  - Initiation of angiogenesis therapy is not an indication for advanced imaging of the brain in asymptomatic individuals (Avastin/Bevacizumab; less than 3% risk of bleeding and less than 1% risk of serious bleeding).
- Bone Scan:
  - Primarily used for evaluation of bone metastases in individuals with solid malignancies.
  - Bone scan MAY be considered medically necessary in individuals with history of malignancy, including bone pain, rising tumor markers, elevated alkaline phosphatase or in individuals with primary bone tumor.
  - For evaluation of suspected or known bony metastases, CPT® 78306 (Nuclear bone scan whole body), is considered medically necessary.
  - Radiopharmaceutical Localization scan SPECT (CPT® 78803 or CPT® 78831) or SPECT/CT (CPT® 78830 or CPT® 78832) is considered medically necessary as an add-on test for further evaluation of a specific area of interest.
  - CPT® codes 78300 (Nuclear bone scan limited), 78305 (Nuclear bone scan multiple areas) or 78315 do not have any indications in oncology nuclear medicine imaging.
- Bone scan supplemented by plain x-rays are the initial imaging modalities for suspected malignant bone pain. For specific imaging indications, see also:
  - **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)**
  - **Bone (Non-Vertebral) Metastases (ONC-31.5)**
  - **Spinal/Vertebral Metastases (ONC-31.6)**
  - **Carcinoma of Unknown Primary Site (ONC-31.7)**
- Advanced imaging used for radiation therapy treatment planning should not be authorized using any of the diagnostic imaging codes for CT, MRI, or PET.
  - Advanced imaging performed in support of radiation therapy treatment planning should be reported with CPT® 76498 for Unlisted MRI or CPT® 76497 for Unlisted CT scan.
- Delay PET/CT for at least 12 weeks after completion of radiation treatment, unless required sooner for imminent surgical resection.
- PET/CT may be considered medically necessary prior to biopsy in order to determine a more favorable site for biopsy when a prior biopsy was nondiagnostic or a relatively

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inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.

- Unless otherwise specified in diagnosis-specific guideline section, PET/CT is considered medically necessary if:
  - conventional imaging (CT, MRI or bone scan) reveals findings that are inconclusive (including signs or symptoms that are highly suspicious for recurrence with no source found on imaging), with continued suspicion for active disease
- Unless specified in diagnosis-specific guideline section, PET/CT imaging is NOT considered medically necessary for:
  - infection, inflammation, trauma, post-operative healing, granulomatous disease, rheumatological conditions
  - concomitant use with separate diagnostic CT studies
  - conclusive evidence of distant or diffuse metastatic disease on recent conventional imaging studies
  - metastatic disease in the central nervous system (CNS)
  - lesions less than 8mm in size
  - follow up after localized therapy (e.g., radiofrequency ablation, embolization, stereotactic radiation, etc.)
  - rare malignancies, due to lack of available evidence regarding the diagnostic accuracy of PET in rare cancers
  - surveillance
    - Serial monitoring of individuals who are not currently receiving anti-tumor treatment or are receiving maintenance treatment
    - Serial monitoring of FDG avidity until resolution
    - PET/CT avidity in a residual mass at the end of planned therapy is not an indication for PET/CT imaging during surveillance
    - Residual mass that has not changed in size since the last conventional imaging does not justify PET imaging
- Unless otherwise specified for a specific cancer type, once PET has been documented to be negative for a given individual's cancer or all PET-avid disease has been surgically resected, PET is not considered medically necessary for continued disease monitoring or surveillance.
- PET/MRI is generally not considered medically necessary for a vast majority of oncologic conditions due to lack of standardization in imaging technique and interpretation. However, it may be approved in select circumstances when the following criteria are met:
  - the individual meets condition-specific guidelines for PET/MRI OR
  - the individual meets ALL of the following:
    - The individual meets guideline criteria for PET/CT, AND
    - PET/CT is not available at the treating institution, AND

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    - The provider requests PET/MRI in lieu of PET/CT
  - When the above criteria are met, PET/MRI may be reported using the code combination of PET Whole-Body (CPT® 78813) and MRI Unlisted (CPT® 76498). All other methods of reporting PET/MRI are inappropriate.
    - When clinically appropriate, diagnostic MRI codes may be considered medically necessary at the same time as the PET/MRI code combination.
- The specific radiotracer planned to be used with PET/CT imaging is required to perform a medical necessity review. Indications for PET/CT imaging using non-FDG radiotracers are listed in diagnosis-specific guidelines.
  - supported radiotracers:
    - ^{18}F-FDG
    - ^{68}Gallium DOTATATE (NETSPOT®) for low-grade neuroendocrine tumors and medullary thyroid cancer
    - ^{64}Cu-DOTATATE (DETECTNET®) for low-grade neuroendocrine tumors
    - ^{68}Ga-DOTA-TOC for low-grade neuroendocrine tumors
    - ^{11}C Choline for prostate cancer
    - ^{18}F-Fluciclovine (AXUMIN®) for prostate cancer
    - ^{68}Ga PSMA-11 for prostate cancer
    - ^{18}F Piflufolastat (Pylarify®) for prostate cancer
    - ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) for prostate cancer
    - ^{18}F Flotufolastat (Posluma®) for prostate cancer
    - ^{18}F Fluoroestradiol (Cerianna®) for breast cancer
    - ^{18}F Na Fluoride PET bone scan for breast cancer and prostate cancer
  - unsupported radiotracers:
    - PET/CT imaging using isotopes other than those specified above
- Octreotide scan:
  - Specific for low and intermediate grade neuroendocrine tumors which express specific cell surface somatostatin receptors. See cancer specific guidelines for recommended use.
  - One of the following codes may be approved when Octreotide scan is requested:
  - CPT® 78802 (Radiopharmaceutical localization of tumor whole-body single day study)
  - CPT® 78804 (Radiopharmaceutical localization of tumor whole-body two or more days)
  - In addition to one of the above CPT codes, CPT® 78803 (Radiopharmaceutical localization of tumor SPECT), SPECT CPT® 78831, or hybrid SPECT/CT (CPT® 78830 or 78832) may be approved as an add-on test for further evaluation of a specific area of interest or clinically suspected lesions with negative whole

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body bone scan or documented bone metastasis in the setting of inconclusive or negative findings.

Clinical Trials

- Similar to investigational and experimental studies, clinical trial imaging requests will be considered to determine whether they meet these evidence-based guidelines.
- Imaging studies which are inconsistent with established clinical standards, or are requested for data collection and not used in direct clinical management are not considered medically necessary.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Key Principles (ONC-1.1)

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AGE APPROPRIATE GUIDELINES	
Age of Individual	**Appropriate Imaging Guidelines**
19 years of age or older at initial diagnosis	• General Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section
Under 19 years of age at initial diagnosis	• Pediatric and Special Populations Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section
15 to 39 years old at initial diagnosis (defined as Adolescent and Young Adult (AYA) oncology individuals)	• When unique guidelines for a specific cancer type exist only in either General Oncology or Pediatric and Special Populations Oncology, AYA individuals should be imaged according to the guideline section for their specific cancer type, regardless of the individual's age • When unique guidelines for a specific cancer type exist in both General Oncology and Pediatric and Special Populations Oncology, AYA individuals should be imaged according to the age rule in the previous bullet

Criteria

- Conventional imaging (mostly CT, sometimes MRI or bone scan) of the affected area(s) drives much of initial and re-staging and surveillance. PET is not considered medically necessary for surveillance imaging unless specifically stated in the diagnosis-specific guideline sections.
- Brain imaging is performed for signs or symptoms of brain disease.
  - MRI Brain without and with contrast (CPT® 70553) is the preferred study for evaluation of suspected or known brain metastases.
  - MRI Brain without and with contrast (CPT® 70553) is considered medically necessary if a non-contrast CT Head shows suspicious lesion.
  - CT Head without and with contrast (CPT® 70470) is considered medically necessary when MRI is contraindicated or not available, or if there is skull bone involvement.

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  - Initiation of angiogenesis therapy is not an indication for advanced imaging of the brain in asymptomatic individuals (Avastin/Bevacizumab; less than 3% risk of bleeding and less than 1% risk of serious bleeding).
- Individuals receiving cardiotoxic chemotherapy (such as doxorubicin, trastuzumab, pertuzumab, mitoxantrone, etc.) may undergo cardiac evaluation – at baseline and for monitoring while on active therapy.
  - See: **Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD) (CD-12.1)** in the Cardiology Imaging Guidelines
- CTA or MRA of a specific anatomic region is considered medically necessary when requested for surgical planning when there is suspected vascular proximity to proposed resection margin.
- Screening adults (18 years of age or older) with a diagnosis of Li-Fraumeni Syndrome (LFS) for malignancy with a Whole-Body MRI (CPT® 76498) is considered medically necessary on an annual basis. Annual Brain MRI (CPT® 70553) may be performed as part of Whole-Body MRI or as a separate exam. Due to lack of standardization of technique, interpretation, and availability of Whole-Body MRI, individuals with LFS are encouraged to participate in clinical trials.

Use of Contrast Criteria

- CT imaging should be performed with contrast for known or suspected body regions, unless contraindicated.
  - Shellfish allergy is not a contraindication to contrast. Individuals with known shellfish allergy do not have contrast reaction any more often than other atopic individuals or individuals with other food allergies.
  - For iodinated contrast dye allergy, either CT scans without contrast or MRI scans without and with contrast are considered medically necessary.
  - If CT scanning is considered medically necessary in an individual with known contrast allergy, CT with contrast may be considered to be safely performed following prednisone pre-medication over a 24-hour period prior to the study.
- For individuals with renal insufficiency which precludes contrast use, CT without contrast in appropriate disease-specific areas is considered medically necessary. Further imaging (such as MRI) is considered medically necessary if non-contrast CT results are inconclusive.
- Severe renal insufficiency (i.e., an eGFR less than 30) is a contraindication for an MRI using a gadolinium-based contrast agent (GBCA) as well. In individuals with eGFR greater than 40, GBCA administration can be safely performed. GBCA administered to individuals with acute kidney injury or severe chronic kidney disease can result in a syndrome of nephrogenic systemic fibrosis (NSF), but GBCAs are not considered nephrotoxic at dosages approved for MRI.
- Gadolinium deposition has been found in individuals with normal renal function following the use of GBCAs.

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- The U.S. Food and Drug Administration (FDA) is investigating the risk of brain deposits following repeated use of GBCAs.
- The FDA has noted that, “It is unknown whether these gadolinium deposits are harmful or can lead to adverse health effects” and have recommended:
  - To reduce the potential for gadolinium accumulation, health care professionals should consider limiting GBCA use to clinical circumstances in which the additional information provided by the contrast is necessary.
  - Health care professionals are also urged to reassess the necessity of repetitive GBCA MRIs in established treatment protocols.

Radiation Exposure Criteria

- The use of MRI in place of CT scans to reduce risk of secondary malignancy from radiation exposure during CT is not supported by the peer-reviewed literature. Unless otherwise specified in the Guidelines or in pregnant individuals as noted below, MRI in place of CT scans for this purpose alone is not considered medically necessary. In some instances (i.e., testicular cancer surveillance), MRI may be considered inferior to CT scans.
  - For pregnant individuals, ultrasound or MRI may be obtained as first-line imaging as requested to reduce radiation exposure.

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Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)

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Criteria

- This section does not apply to PET imaging. PET imaging considerations can be found in **PET Imaging in Oncology (ONC-1.4)**
- Bone Scan:
  - Primarily used for evaluation of bone metastases in individuals with solid malignancies
  - Indications for bone scan in individuals with history of malignancy include bone pain, rising tumor markers, elevated alkaline phosphatase or in individuals with primary bone tumor
  - For evaluation of suspected or known bony metastases, CPT® 78306 (Nuclear bone scan whole-body), is considered medically necessary.
    - Radiopharmaceutical Localization scan SPECT (CPT® 78803 or CPT® 78831) or SPECT/CT (CPT® 78830 or CPT® 78832) is considered medically necessary as an add-on test for further evaluation of a specific area of interest or clinically suspected lesions with negative whole body bone scan or documented bone metastasis in the setting of inconclusive or negative findings.
  - CPT® codes 78300 (Nuclear bone scan limited), 78305 (Nuclear bone scan multiple areas) or 78315 do not have any indications in oncology nuclear medicine imaging.
- Octreotide scan:
  - Specific for low and intermediate grade neuroendocrine tumors which express specific cell surface somatostatin receptors. See cancer specific guidelines for recommended use.
  - One of the following codes may be approved when Octreotide scan is requested:
    - CPT® 78802 (Radiopharmaceutical localization of tumor whole-body single day study)
    - CPT® 78804 (Radiopharmaceutical localization of tumor whole-body two or more days)
  - In addition to one of the above CPT codes, CPT® 78803 (Radiopharmaceutical localization of tumor SPECT), SPECT CPT® 78831, or hybrid SPECT/CT (CPT® 78830 or 78832) may be approved as an add-on test for further evaluation of a specific area of interest.
- Bone marrow imaging:

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  - This study is rarely performed for evaluation of the entire bone marrow in conditions like myeloproliferative disorders, sickle cell bone infarct or ischemia, avascular necrosis or myeloma.
  - The correct CPT code for this study is CPT® 78104 (Diagnostic Nuclear Medicine Procedures on the Hematopoietic, Reticuloendothelial and Lymphatic System).
- Brain imaging SPECT with Technetium-99m or thallium-201 (CPT® 78803 or CPT® 78830):
  - Immunocompromised individuals with mass lesion detected on CT or MRI for differentiation between lymphoma and infection
  - In distinguishing recurrent brain tumor from radiation necrosis
- Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s):
  - CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78804, CPT® 78803, CPT® 78831 (SPECT), or CPT® 78830 or CPT® 78832 (SPECT/CT)
  - for evaluation of fever of unknown origin and osteomyelitis
  - for suspected infections such as infected central lines, grafts or shunts
- Gallium Isotope Scan:
  - Radiopharmaceutical Localization of tumor (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804), SPECT CPT® 78831, or hybrid SPECT/CT CPT® 78830 or 78832
  - This may be rarely used in place of PET/CT scan when PET/CT scan not available and PET/CT is indicated by guidelines for lymphoma, sarcoma, melanoma or myeloma.

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PET Imaging in Oncology (ONC-1.4)

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Criteria

- CPT codes:
  - PET imaging in oncology should use PET/CT fusion (CPT® 78815 or CPT® 78816). Unbundling PET/CT imaging into separate PET and diagnostic CT codes is otherwise not considered medically necessary.
  - The decision whether to use skull base to mid-femur (“eyes to thighs”) procedure code for PET (CPT® 78812 or CPT® 78815) or whole-body PET (CPT® 78813 or CPT® 78816) is addressed in the diagnosis-specific guideline sections.
  - ”Limited area” protocol is done infrequently, but may be considered medically necessary, and is reported with PET (CPT® 78811) or for PET/CT (CPT® 78814).
- Radiotracers:
  - Unless specified otherwise, the term “PET” refers to ^{18}F-FDG-PET and PET/CT fusion studies.
  - Indications for PET/CT imaging using non-FDG radiotracers are listed in diagnosis-specific guidelines. The indications may be as follows:
- Supported radiotracers:
  - ^{18}F-FDG
  - ^{68}Gallium DOTATATE (NETSPOT®) for low-grade neuroendocrine tumors and medullary thyroid cancer
  - ^{64}Cu-DOTATATE (DETECTNET®) for low-grade neuroendocrine tumors
  - ^{68}Ga-DOTA-TOC for low-grade neuroendocrine tumors
  - ^{11}C Choline for prostate cancer
  - ^{18}F-Fluciclovine (AXUMIN®) for prostate cancer
  - ^{68}Ga PSMA-11 for prostate cancer
  - ^{18}F Piflufolastat (Pylarify®) for prostate cancer
  - ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) for prostate cancer
  - ^{18}F Flotufolastat (Posluma®) for prostate cancer
  - ^{18}F Fluoroestradiol (Cerianna®) for breast cancer
  - ^{18}F Na Fluoride PET bone scan for breast cancer and prostate cancer
- Unsupported radiotracers:
  - PET/CT imaging using isotopes other than those specified above

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CPT/ HCPCS Code	Code Description	Brand or common name	Guideline Section and Cancer Type
A9552	^{18}F Fluoro deoxyglucose	FDG	Various guideline sections where PET is indicated
A9580	^{18}F Sodium fluoride	N/A	ONC-11: Breast Cancer, ONC-19: Prostate Cancer
A9587	^{68}Ga-68 Dotatate	NETSPOT®	ONC-15: Low-grade neuroendocrine tumors, ONC-6: Medullary thyroid cancer
A9515	^{11}C Choline	N/A	ONC-19, Prostate Cancer
A9588	^{18}F-Fluciclovine	AXUMIN®	ONC-19, Prostate Cancer
A9593 A9594	^{68}Ga PSMA-11	N/A	ONC-19, Prostate Cancer
A9595	^{18}F Piflufolastat	Pylarify®	ONC-19, Prostate Cancer
A9596	^{68}Ga Gozetotide	Illuccix®	ONC-19, Prostate Cancer
A9800	^{68}Ga Gozetotide	Locametz®	ONC-19, Prostate Cancer
A9616	^{68}Ga Gozetitide	Gozellix®	ONC-19, Prostate Cancer
A9608	^{18}F Flotufolastat	Posluma®	ONC-19, Prostate Cancer
A9591	^{18}F Fluoroestradiol	Cerianna®	ONC-11, Breast Cancer
A9592	^{64}Cu Copper dotatate	Detectnet®	ONC-15, Low-grade neuroendocrine tumors
C9067	^{68}Ga Gallium-DOTA-TOC	N/A	ONC-15, Low-grade neuroendocrine tumors

- Unless specified in diagnosis-specific guideline section, PET/CT imaging is NOT considered medically necessary for:

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- infection, inflammation, trauma, post-operative healing, granulomatous disease, rheumatological conditions
- concomitant use with separate diagnostic CT studies
- conclusive evidence of distant or diffuse metastatic disease on recent conventional imaging studies
- metastatic disease in the central nervous system (CNS)
- lesions less than 8mm in size
- follow up after localized therapy (i.e., radiofrequency ablation, embolization, stereotactic radiation, etc.)
- rare malignancies, due to lack of available evidence regarding the diagnostic accuracy of PET in rare cancers
- surveillance:
  - Serial monitoring of individuals who are not currently receiving anti-tumor treatment or are receiving maintenance treatment
  - Serial monitoring of FDG avidity until resolution.
  - PET/CT avidity in a residual mass at the end of planned therapy is not an indication for PET/CT imaging during surveillance.
  - Residual mass that has not changed in size since the last conventional imaging does not justify PET imaging
- Unless otherwise specified for a specific cancer type, once PET has been documented to be negative for a given individual's cancer or all PET-avid disease has been surgically resected, PET should not be used for continued disease monitoring or surveillance.

- Unless otherwise specified in diagnosis-specific guideline section, PET/CT is considered medically necessary if:
  - Conventional imaging (CT, MRI or bone scan) reveals findings that are inconclusive (including signs or symptoms that are highly suspicious for recurrence with no source found on imaging), with continued suspicion for active disease.
  - The individual is undergoing salvage treatment for a recurrent solid tumor with residual measurable disease on conventional imaging and confirmed repeat negative PET imaging will allow the individual to transition from active treatment to surveillance.
  - PET/CT may be considered prior to biopsy in order to determine a more favorable site for biopsy when a prior biopsy was nondiagnostic or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.
- PET/CT for rare malignancies is not covered by these guidelines due to lack of available evidence regarding diagnostic accuracy of PET/CT in the majority of rare cancers. Conventional imaging studies should be used for initial staging and

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treatment response for these diagnoses. PET/CT is considered medically necessary if all of the following apply:
  - Conventional imaging (CT, MRI or bone scan) reveals equivocal or suspicious findings.
  - No other specific metabolic imaging (MIBG, octreotide, technetium, etc.) is appropriate for the disease type.
  - The submitted clinical information describes a specific decision regarding the individual's care that will be made based on the PET/CT results.
- Delay PET/CT for at least 12 weeks after completion of radiation treatment, unless required sooner for imminent surgical resection.
- PET Mammography (PEM, generally reported with CPT® 78811) is considered experimental and investigational at this time.
- PET/MRI is generally not considered medically necessary for a vast majority of oncologic conditions due to lack of standardization in imaging technique and interpretation. However, it may be approved in select circumstances when the following criteria are met:
  - The individual meets condition-specific guidelines for PET/MRI OR
  - The individual meets ALL of the following:
    - The individual meets guideline criteria for PET/CT, AND
    - PET/CT is not available at the treating institution, AND
    - The provider requests PET/MRI in lieu of PET/CT
  - When the above criteria are met, PET/MRI may be reported using the code combination of PET Whole-Body (CPT® 78813) and MRI Unlisted (CPT® 76498). All other methods of reporting PET/MRI are inappropriate.
    - When clinically appropriate, diagnostic MRI codes may be indicated at the same time as the PET/MRI code combination.
    - PET/MRI Brain may be reported using the code combination of (CPT® 78811) and (CPT® 76498).

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Unlisted Procedure Codes in Oncology (ONC-1.5)

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Criteria

- There is often no unique procedure code for a service performed solely for treatment planning purposes. AMA instructions in the CPT® state that if no specific code exists for a particular service, the service is reported with an unlisted code.
- Advanced imaging being used for radiation therapy treatment planning should not be authorized using any of the diagnostic imaging codes for CT, MRI or PET. Advanced imaging performed in support of radiation therapy treatment planning should be reported with:
  - **CPT® 76498 for Unlisted MRI** – when MRI will be used for treatment planning of radiation therapy to be delivered ONLY to the brain, prostate and cervix. The use of this code for radiation treatment planning of any other cancers/body parts not listed above may be reviewed on a case-by-case basis. Also on a case-by-case basis, an additional diagnostic study may be considered medically necessary if there is an additional clinical question requiring reading and interpretation of the study by a diagnostic radiologist (i.e., the study is not used exclusively for radiation treatment planning).
  - **CPT® 76497 for Unlisted CT** – may NOT be used for radiation treatment planning. CT imaging performed in support of radiation therapy treatment planning is bundled in with the concurrent radiation treatment authorization codes and a separate authorization for treatment planning is not required.
  - Imaging associated with image-directed biopsy should be reported with the corresponding interventional codes.
  - For advanced imaging used solely for the purpose of Surgical planning, see: **Unlisted Procedures/Therapy treatment planning (Preface-4.3)** in the Preface Imaging Guidelines
  - CPT® 76376 and CPT® 76377 are not considered medically necessary for the standard radiation therapy treatment planning process.

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Predisposition Syndromes (ONC-1.6)

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- For predisposition syndrome screening in adult individuals, see: **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Primary Central Nervous System Tumors (ONC-2)

Guideline

Primary Central Nervous System Tumors – General Considerations (ONC-2.1)
Low Grade Gliomas (ONC-2.2)
High Grade Gliomas (ONC-2.3)
Medulloblastoma (MDB), Other CNS Embryonal Tumors, and Pineoblastoma (ONC-2.4)
Ependymal Tumors (Ependymoma) (ONC-2.5)
Central Nervous System Germ Cell Tumors (ONC-2.6)
CNS Lymphoma (Also Known as Microglioma) (ONC-2.7)
Meningiomas (Intracranial and Intraspinal) (ONC-2.8)
Spinal Cord Tumors (Benign and Malignant) (ONC-2.9)
Choroid Plexus Tumors (ONC-2.10)
References (ONC-2)

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Primary Central Nervous System Tumors – General Considerations (ONC-2.1)

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Criteria

- This guideline section applies to primary CNS tumors only. For imaging guidelines in metastatic brain cancer, see the appropriate diagnosis-specific section or **Brain Metastases (ONC-31.3)** for imaging guidelines.
- Histologic confirmation is critical. Therapeutic decisions should not be made on radiographic findings alone, except for ANY of the following:
  - Medically fragile individuals for whom attempted biopsy carries excess medical risk, as stated in writing by both the attending physician and surgeon.
  - Brain stem tumors or other sites where the imaging findings are pathognomonic and the risk of permanent neurological damage is excessive with even a limited biopsy attempt.
- For evaluation of known or suspected spinal cord compromise, see: **Spinal/Vertebral Metastases (ONC-31.6)**
- For suspected brain tumors in neurofibromatosis, see: **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)** in the Pediatric and Special Populations Oncology Imaging Guidelines
- Rare tumors occurring more commonly in the pediatric population should be imaged according to the imaging guidelines in: **Pediatric Central Nervous System Tumors (PEDONC-4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Indication	Medically Necessary Imaging Study
Characterization and follow up of all brain tumors	ANY or ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • CT Head without and with contrast (CPT® 70470) when MRI is contraindicated or not available, or there is skull bone involvement • CT Head (contrast as requested) for preoperative planning when requested by the operating surgeon

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Indication	Medically Necessary Imaging Study
Preoperative planning or to clarify inconclusive findings on MRI or CT in individuals with primary CNS tumors	• MRA Head (CPT® 70544) or CTA Head (CPT® 70496)
Within 24 to 72 hours following brain tumor surgery in individuals with primary CNS tumors	• MRI Brain without and with contrast (CPT® 70553)
Clinical deterioration or development of new neurological features in individuals with primary CNS tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) for signs/symptoms of spinal involvement or if spinal involvement is suspected

MR Spectroscopy Criteria in Brain Tumors (MRS, CPT® 76390)

- MRS is only considered medically necessary for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature.
  - See diagnosis-specific guidelines for MRS indications
- MRS is considered not medically necessary for all other histologies and indications not listed in a diagnosis-specific guideline section.

PET Brain Imaging Criteria (CPT® 78608 and CPT® 78609)

- PET Brain Metabolic Imaging (CPT® 78608) is only considered medically necessary for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature.
- PET Brain metabolic imaging (CPT® 78608) is considered not medically necessary for all other histologies and indications not listed in a diagnosis-specific guideline section in individuals with primary CNS tumors.
- PET Brain perfusion imaging (CPT® 78609) is not considered medically necessary in the evaluation or management of primary CNS tumors.
- Body PET studies (CPT® 78811, CPT® 78812, and CPT® 78813) and fusion PET/CT studies (CPT® 78814, CPT® 78815, or CPT® 78816) are not considered medically necessary in the evaluation or management of primary CNS tumors.

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- See: **Other Imaging Studies (HD-24)** in the Head Imaging Guidelines for details on other advanced neuro-imaging studies.

Background and Supporting Information

Primary central nervous system (CNS) tumors are neoplasms arising from brain parenchyma, cranial nerves, meninges, or supporting structures, and are distinct from secondary (metastatic) intracranial disease. Primary CNS tumors account for 1.4% of all new cancer diagnoses in the United States and 2.7% of deaths due to cancer. Contemporary classification of primary CNS tumors is based on an integrated histologic and molecular framework, as defined by the World Health Organization (WHO) Classification of Tumors of the Central Nervous System, Fifth Edition (CNS5). This system incorporates histopathologic features together with molecular alterations to define biologically and clinically meaningful tumor entities and grades, which directly inform prognosis and management (Louis et al., 2021). Low grade tumors (WHO I, II) are the most common primary brain tumors (71.7% of all tumors). High grade tumors (WHO II/IV) account for 28.3% of all tumors. Meningioma is the most common low grade tumor accounting for 39.7% of all tumors. Glioblastoma is the most common malignant glioma accounting for 15.4% of all tumors.

Histologic confirmation is fundamental to the diagnosis and management of primary CNS tumors. Molecular profiling, including markers such as IDH mutation status, 1p/19q codeletion, ATRX loss, and H3 alterations, is now considered an essential component of tumor characterization rather than an adjunctive test. This approach is supported by international consensus and clinical practice guidelines, which emphasize that therapeutic decisions should not be based on imaging findings alone except in limited, well-defined circumstances where biopsy poses unacceptable risk or imaging features are pathognomonic (Louis et al., 2021; NCCN, 2026).

Evidence Discussion

The clinical criteria supporting imaging evaluation of primary CNS tumors are grounded in evidence demonstrating that accurate anatomic and biologic characterization is critical to optimizing outcomes while minimizing unnecessary risk. MRI with and without contrast provides superior soft-tissue contrast and sensitivity for intracranial tumors compared with CT, particularly for posterior fossa lesions, multifocal disease, and leptomeningeal involvement. Multiple guideline bodies emphasize MRI as the preferred modality because it directly informs diagnosis, surgical planning, and post-treatment assessment (NCCN, 2026; NICE, 2021).

Requiring histologic confirmation whenever feasible reflects strong evidence that imaging features alone cannot reliably distinguish among CNS tumor subtypes or predict molecular characteristics that drive prognosis and therapy. Integrated histologic-molecular classification has been shown to outperform imaging-based assessment

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in predicting clinical behavior and treatment response. Exceptions to tissue diagnosis are limited to scenarios in which biopsy carries excessive risk or is unlikely to alter management, thereby balancing diagnostic benefit against potential harm (Louis et al., 2021; NCCN, 2026).

Advanced imaging modalities offer incremental benefit in selected circumstances but also introduce potential harms, including increased scan time, interpretive complexity, and risk of misclassification when applied indiscriminately. Evidence supports the selective use of MR perfusion and MR spectroscopy in specific tumor types to aid in distinguishing viable tumor from treatment effects and in identifying areas of highest tumor grade for biopsy. However, inconsistent diagnostic performance across histologies and dependence on technical expertise limit their role to narrowly defined indications (ACR, 2016; ACR, 2017; Mabray et al., 2015).

Similarly, metabolic brain PET imaging has shown utility in selected primary CNS tumor histologies but lacks sufficient evidence to support routine use across all tumor types. Body PET imaging and perfusion PET of the brain have not demonstrated clinical benefit in the evaluation or management of primary CNS tumors and expose patients to unnecessary radiation without clear impact on outcomes. Restricting these modalities aligns evidence-based benefit with patient safety, resource stewardship, and avoidance of diagnostic harm (Kong et al., 2018; NCCN, 2026; NICE, 2021).

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Low Grade Gliomas (ONC-2.2)

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Criteria

- These tumors are defined as having a World Health Organization (WHO) histologic grade of I or II (out of IV), can occur anywhere in the CNS, and includes the following:
  - Diffuse low-grade gliomas
    - Fibrillary (or Diffuse) Astrocytoma
    - Angiocentric glioma
  - Circumscribed astrocytic gliomas
    - Pilocytic Astrocytoma
    - High-grade astrocytoma with piloid features
    - Pleomorphic xanthoastrocytoma
    - Pilomyxoid Astrocytoma
    - Oligoastrocytoma
    - Subependymal Giant Cell Astrocytoma (SEGA)
    - Choroid glioma
    - Astroblastoma, MN
  - Glioneuronal and neuronal tumors
    - Ganglioglioma
    - Gangliocytoma
    - Gangliogliomeuroma
    - Diffuse glioneuronal tumor with oligodendroglioma-like features and nuclear clusters
    - Papillary glioneuronal tumor
    - Rosette-forming glioneuronal tumor
    - Myxoid glioneuronal tumor
    - Diffuse leptomeningeal glioneuronal tumor
    - Gangliocytoma Multinodular and vacuolating neuronal tumor
    - Dysplastic cerebellar gangliocytoma (Lhermitte-Duclos disease)
    - Central neurocytoma
    - Extraventricular neurocytoma
    - Cerebellar liponeurocytoma
  - Optic Pathway Gliomas
  - Oligodendroglioma
  - Oligodendrocytoma

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- Dysembryoplastic infantile astrocytoma (DIA)
- Dysembryoplastic infantile ganglioglioma (DIG)
- Dysembryoplastic neuroepithelial tumor (DNT)
- Tectal plate gliomas
- Cervicomedullary gliomas
- Pleomorphic xanthoastrocytoma (PXA)
- Any other glial tumor with a WHO grade of I or II classification

Indication	Medically Necessary Imaging Study
Initial staging of low grade gliomas	• MRI Brain without and with contrast (CPT® 70553) if not already done • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) ◦ MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain
After initial resection or other treatment (radiation therapy, etc.) in individuals with low grade gliomas	• MRI Brain without and with contrast (CPT® 70553)
For individuals with low grade gliomas undergoing chemotherapy treatment	• MRI Brain without and with contrast (CPT® 70553) every 2 cycles • Individuals with spinal cord involvement at diagnosis can have MRI without and with contrast of the involved spinal region on the same schedule as MRI brain

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Indication	Medically Necessary Imaging Study
ONE of the following in individuals with low grade gliomas: • Determine need for biopsy when transformation to high-grade glioma is suspected based on clinical symptoms or recent MRI findings • Evaluate a brain lesion of indeterminate nature when the study will be used to determine whether biopsy/resection can be safely postponed	ANY of the following: • PET Brain Metabolic Imaging (CPT® 78608) • MRI Perfusion imaging (CPT® 70553)
ONE of the following in individuals with low grade gliomas: • Distinguish low-grade from high-grade gliomas • Evaluate a brain lesion of indeterminate nature when the study will be used to determine whether biopsy/resection can be safely postponed • Distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy	ANY of the following: • MR Spectroscopy (CPT® 76390) • MRI Perfusion imaging (CPT® 70553)
Suspected intracranial or intraspinal recurrence in individuals with low grade gliomas	• All imaging considered medically necessary for initial staging
Surveillance, grade I gliomas	• MRI Brain without and with contrast (CPT® 70553) every 3 months for up to 5 years • Individuals with spinal cord involvement at diagnosis: MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) on the same schedule as MRI Brain

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Indication	Medically Necessary Imaging Study
Surveillance, grade II gliomas (Karnofsky Performance Score greater than or equal to 60, not poor performance status as below)	• MRI Brain without and with contrast (CPT® 70553) every 3 months for 5 years, then every 6 months thereafter • Individuals with spinal cord involvement at diagnosis: MRI Spine without and with contrast (Cervical- CPT® 72156, Thoracic- CPT® 72157, Lumbar- CPT® 72158) on the same schedule as MRI Brain
Surveillance, grade II gliomas and poor performance status (Karnofsky Performance Score less than 60)	• MRI Brain without and with contrast (CPT® 70553) every 2 months for 3 years, then every 3 months thereafter • Individuals with spinal cord involvement at diagnosis: MRI Spine without and with contrast (Cervical- CPT® 72156, Thoracic- CPT® 72157, Lumbar- CPT® 72158) on the same schedule as MRI Brain

Background and Supporting Information

Low grade gliomas are primary central nervous system tumors defined by a World Health Organization (WHO) histologic grade of I or II. These tumors arise from glial or mixed neuronal-glial cells and may occur throughout the brain and spinal cord. The category encompasses a heterogeneous group of entities, including pilocytic astrocytoma, fibrillary (or diffuse) astrocytoma, optic pathway gliomas, pilomyxoid astrocytoma, oligodendroglioma, oligoastrocytoma, oligodendeocytoma, subependymal giant cell astrocytoma (SEGA), ganglioglioma, gangliocytoma, dysembryoplastic infantile astrocytoma (DIA), dysembryoplastic infantile ganglioglioma (DIG), dysembryoplastic neuroepithelial tumor (DNT), tectal plate gliomas, cervicomedullary gliomas, pleomorphic xanthoastrocytoma (PXA), and any other glial tumor with a WHO grade of I or II (Louis et al., 2021).

Low grade gliomas often demonstrate indolent growth but are associated with long-term risks of progression, malignant transformation, and treatment-related morbidity. Tumors may disseminate via cerebrospinal fluid pathways, particularly in pediatric and midline or optic pathway gliomas, making assessment of the entire neuraxis clinically relevant at diagnosis. Functional status, often measured using performance scales such as the Karnofsky Performance Score, is a recognized prognostic factor and influences monitoring intensity and management strategies (NCCN, 2026).

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Evidence Discussion

The imaging approach for low grade gliomas balances the need for thorough disease assessment with the goal of minimizing patient risk and unnecessary testing. MRI of the brain provides high sensitivity for tumor detection, anatomic delineation, and assessment of postoperative or post-treatment change. Inclusion of spinal MRI during initial staging is supported by evidence that leptomeningeal spread, although uncommon, significantly affects prognosis and management, particularly in pediatric low grade gliomas and tumors with midline or ventricular involvement (NCCN, 2026; NICE, 2021).

Establishing a post-treatment imaging baseline following resection, radiation, or other therapy is clinically important for distinguishing treatment-related effects from residual or recurrent disease on subsequent studies. During active therapy, interval MRI assessments allow for timely detection of progression or complications and may guide modification of therapy. Patients with poorer performance status are at increased risk for clinical deterioration, supporting closer imaging surveillance to promptly identify actionable changes (NCCN, 2026).

Advanced imaging modalities provide additional biologic information but have limitations that preclude routine use. MR perfusion imaging can reflect tumor vascularity and has demonstrated value in identifying malignant transformation or distinguishing progression from treatment effect. MR spectroscopy can assist in differentiating low-grade from higher-grade lesions and in evaluating suspected radiation necrosis. However, variability in acquisition, interpretation, and diagnostic performance across tumor types necessitates restricting these techniques to well-defined clinical indications to avoid misclassification and overtreatment (ACR, 2016; ACR, 2017; Mabray et al., 2015).

Similarly, brain metabolic PET imaging may support decision-making in select cases by helping identify higher-grade components or guiding biopsy when transformation is suspected. Evidence does not support routine use of PET or whole-body imaging in low grade gliomas, as these approaches add radiation exposure and cost without demonstrable benefit in most patients. Limiting advanced imaging to problem-solving scenarios aligns clinical benefit with patient safety and evidence-based resource utilization (Kong et al., 2018; NICE, 2021).

Health Equity Considerations

Low-grade gliomas (LGGs) exhibit clinically meaningful variation in incidence, tumor characteristics, and outcomes across demographic groups, underscoring the relevance of health equity considerations in diagnostic and longitudinal imaging. Population-level analyses demonstrate that survival outcomes for LGG differ by age, sex, race, and ethnicity, with older age at diagnosis independently associated with poorer disease-specific survival (Cao et al., 2023). Differences in tumor biology,

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clinical presentation, and disease trajectory across demographic groups may influence prognosis and the intensity and frequency of imaging surveillance over time. These variations highlight the importance of applying consistent, evidence-based imaging strategies for LGG diagnosis and follow-up to support accurate risk stratification and timely clinical decision-making across diverse patient populations.

Sociodemographic and structural determinants of health further contribute to inequities in LGG care and outcomes. Patients from lower socioeconomic backgrounds and historically marginalized racial and ethnic groups report worse health-related quality of life and encounter greater barriers to specialty neuro-oncologic care, including delays in advanced neuroimaging, reduced continuity of surveillance, and limited access to supportive services (Perez et al., 2026). Given the prolonged clinical course of LGGs and reliance on serial imaging to guide management, inconsistent access to guideline-concordant imaging may exacerbate disparities through delayed detection of progression or fragmented follow-up. Standardized imaging recommendations aim to reduce unwarranted variation in care delivery, and attention to known disparities in access and outcomes is essential to ensure that LGG imaging is applied equitably, particularly for patients at higher risk of delayed presentation, interrupted surveillance, or under-treatment (Cao et al., 2023; Perez et al., 2026).

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High Grade Gliomas (ONC-2.3)

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Criteria

- These tumors are defined as having a WHO histologic grade of III or IV (out of IV can occur anywhere in the CNS (though the majority occur in the brain), and include the following tumors:
  - Anaplastic astrocytoma
  - Glioblastoma multiforme
  - Diffuse intrinsic pontine glioma (DIPG, or “brainstem glioma”)
  - Gliomatosis cerebri
  - Gliosarcoma
  - Anaplastic oligodendroglioma
  - Anaplastic ganglioglioma
  - Anaplastic mixed glioma
  - Anaplastic mixed ganglioneuronal tumors
  - Any other glial tumor with a WHO grade of III or IV

Indication	Medically Necessary Imaging Study
Initial staging of high grade gliomas	• MRI Brain without and with contrast (CPT® 70553) if not already done • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) ◦ MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain
Immediately following partial or complete resection in individuals with high grade gliomas	• MRI Brain without and with contrast (CPT® 70553)
Immediately following radiation therapy (XRT) in individuals with high grade gliomas	• MRI Brain without and with contrast (CPT® 70553) once within 2 to 8 weeks following completion of treatment, and then go to surveillance imaging

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Indication	Medically Necessary Imaging Study
For individuals with high grade gliomas undergoing chemotherapy treatment	• MRI Brain without and with contrast (CPT® 70553) every 2 cycles • Individuals with spinal cord involvement at diagnosis: MRI without and with contrast of the involved spinal region on the same schedule as MRI Brain
ONE of the following in individuals with high grade gliomas: • Distinguish low-grade from high-grade gliomas • Evaluate a brain lesion of indeterminate nature when the study will be used to determine whether biopsy/resection can be safely postponed • Distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy	ANY of the following: • MR Spectroscopy (CPT® 76390) • MRI Perfusion imaging (CPT® 70553)
ONE of the following in individuals with high grade gliomas: • Distinguish radiation-induced tumor necrosis from progressive disease • Evaluate inconclusive MRI findings when the study will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance • Evaluate a brain lesion of indeterminate nature when the study will be used to determine whether biopsy/resection can be safely postponed	ANY of the following: • MRI Perfusion imaging (CPT® 70553) • PET Brain metabolic imaging (CPT® 78608) ◦ PET Brain is not considered medically necessary in gliomas occurring in the brain stem due to poor uptake and lack of impact on individual outcomes

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Indication	Medically Necessary Imaging Study
Suspected intracranial or intraspinal recurrence in individuals with high grade gliomas	• All imaging is considered medically necessary for initial staging
Surveillance in individuals with high grade gliomas	• MRI Brain without and with contrast (CPT® 70553) every 2 months for 3 years and every 3 months thereafter • Individuals with spinal cord involvement at diagnosis: MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) on the same schedule as MRI Brain

Background and Supporting Information

High grade gliomas are primary central nervous system tumors defined by a World Health Organization (WHO) histologic grade of III or IV. These tumors arise from glial cells and may occur anywhere within the CNS, although the majority originate in the cerebral hemispheres. Entities in this category include anaplastic astrocytoma, glioblastoma multiforme, diffuse intrinsic pontine glioma (DIPG, or "brainstem glioma"), gliomatosis cerebri, gliosarcoma, anaplastic oligodendroglioma, anaplastic ganglioglioma, anaplastic mixed glioma, anaplastic mixed ganglioneuronal tumors, and any other glial tumor with a WHO grade of III or IV (Louis et al., 2021).

High grade gliomas are characterized by aggressive growth, infiltrative behavior, and a high propensity for recurrence despite multimodality therapy. Tumor-related mass effect, edema, and involvement of eloquent brain regions are common, and cerebrospinal fluid dissemination may occur, particularly in pediatric and midline tumors. Baseline and longitudinal imaging play a critical role in defining disease extent, treatment response, and progression (NCCN, 2026; NICE, 2021).

Evidence Discussion

Imaging strategies for high grade gliomas emphasize timely, comprehensive assessment while avoiding unnecessary testing or delays in care. MRI of the brain without and with contrast is the foundation of imaging evaluation, providing critical information regarding tumor extent, enhancement characteristics, and treatment-related change. Inclusion of whole-spine MRI at initial staging is supported by evidence that detection of spinal metastases or leptomeningeal disease alters prognosis and therapeutic strategy, particularly in aggressive or midline tumors (NCCN, 2026; NICE, 2021).

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Postoperative and post-radiation MRI establishes a new baseline for comparison and is essential for distinguishing residual tumor from postoperative change or early treatment effects. During active chemotherapy, interval MRI allows for assessment of disease response and early identification of progression or complications. Patients with documented spinal involvement benefit from concurrent imaging of the affected spinal region on the same schedule, supporting coordinated disease monitoring without unnecessary duplication (NCCN, 2026).

Advanced imaging modalities offer incremental diagnostic value but carry recognized limitations that warrant restricted use. MR perfusion imaging can estimate tumor vascularity and has demonstrated utility in differentiating recurrent tumor from radiation-induced necrosis. MR spectroscopy provides metabolic information that may assist in distinguishing high grade from lower grade lesions and in evaluating post-treatment changes. However, variability in technique and interpretation limits these tools to problem-solving roles when standard MRI is inconclusive or insufficient to guide management decisions (ACR, 2016; ACR, 2017; Mabray et al., 2015).

Metabolic brain PET imaging may help clarify indeterminate MRI findings or distinguish progression from treatment-related effects in select cases. Evidence does not support routine PET use across all high grade gliomas, and PET has limited utility in brainstem tumors such as DIPG due to poor tracer uptake and lack of demonstrated impact on outcomes. Restricting PET and other advanced modalities to defined clinical scenarios helps balance diagnostic benefit against radiation exposure, cost, and potential for misleading results (Kong et al., 2018; NICE, 2021).

Health Equity Considerations

High-grade gliomas (HGGs) are aggressive primary brain tumors associated with substantial morbidity and mortality, where timely diagnosis and accurate imaging assessment are critical to clinical decision-making. Emerging evidence demonstrates clinically meaningful sociodemographic disparities in the presentation of HGGs that have direct implications for imaging evaluation. In a multi-institutional retrospective analysis, Black and Hispanic patients were more likely to present with severe neurologic symptoms and radiographic features such as mass effect and midline shift, whereas White patients more frequently presented with subtler cognitive symptoms (Ghosh et al., 2025). These differences in clinical and imaging presentation may influence the urgency of diagnostic workup, patterns of initial neuroimaging utilization, and thresholds for advanced imaging, potentially contributing to downstream differences in treatment planning and outcomes.

Structural and sociodemographic barriers further compound equity challenges in the care of patients with HGGs. Prior studies have documented that patients from marginalized racial and socioeconomic backgrounds are more likely to experience delays in specialty referral, inconsistent follow-up imaging, and barriers related to

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insurance coverage, transportation, and access to high-volume neuro-oncology centers (Perez et al., 2026). Given the central role of MRI in diagnosis, surgical planning, and longitudinal assessment of treatment response in HGG, inconsistent access to timely and guideline-concordant imaging risks exacerbating disparities in disease staging and outcome assessment. Standardized, evidence-based imaging recommendations for suspected and established HGGs promote health equity by supporting consistent evaluation frameworks across care settings, regardless of patient race, ethnicity, or socioeconomic status, and by facilitating more equitable access to appropriate oncologic management and longitudinal monitoring (Ghosh et al., 2025; Perez et al., 2026).

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Medulloblastoma (MDB), Other CNS Embryonal Tumors, and Pineoblastoma (ONC-2.4)

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Criteria

- Includes the following tumors:
  - Medulloblastoma
    - Molecularly-defined Medulloblastoma
      - WNT-activated Medulloblastoma
      - SHH-activated and TP53-wildtype Medulloblastoma
      - SHH-activated and TP53-mutant Medulloblastoma
      - Non-WNT/Non-SHH
    - Medulloblastoma, histologically defined
  - Other CNS Embryonal Tumors (previously supratentorial primitive neuro-ectodermal tumors)
    - CNS embryonal tumor
    - Cribriform neuroepithelial tumor
    - Embryonal tumor with multilayered rosettes
    - CNS neuroblastoma
    - FOXR2-activated CNS tumor with BCOR internal tandem duplication
  - Pineoblastoma
- Risk assessment is important in determining optimal treatment. High-risk features include the following:
  - Spinal metastases (including cytology positive only)
  - Multifocal intracranial tumors
  - Anaplastic histology
  - All other CNS embryonal tumors and pineoblastomas
  - >1.5cm^2 residual tumor area on postoperative MRI and age less than 3 years
- Individuals without any high-risk features are considered "average risk"
- MR Spectroscopy and PET Brain Metabolic are not considered medically necessary for routine surveillance for individuals with MDB, other CNS embryonal tumors, and pineoblastoma.

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Indication	Medically Necessary Imaging Study
Initial staging for all individuals with MDB, other CNS embryonal tumors, and pineoblastoma, preoperatively	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for initial staging for preoperative planning for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**
• At any time, for ANY of the following for individuals with MDB, other CNS embryonal tumors, and pineoblastoma: ◦ For rapid assessment in the acute setting ◦ Evaluation of suspected acute intracranial hemorrhage ◦ Evaluation of ventriculomegaly ◦ Evaluation of shunt-related issues	• CT Head without contrast (CPT® 70450)
• ANY of the following for individuals with MDB, other CNS embryonal tumors, and pineoblastoma: ◦ To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy ◦ To evaluate inconclusive MRI findings when the PET findings will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance ◦ To evaluate a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed	• PET Brain Metabolic Imaging (CPT® 78608)

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Indication	Medically Necessary Imaging Study
• For individuals with MDB, other CNS embryonal tumors, and pineoblastoma: ◦ To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed	• MR Spectroscopy (CPT® 76390)
Postoperative (preferably within 48 hours of surgery) to quantify residual tumor volume for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) if spinal disease was resected
Within 28 days post-op, if spinal imaging was not performed preoperatively for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Treatment response for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• At the start of adjuvant chemotherapy and every 2 cycles until therapy is completed: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
End of treatment evaluation for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine with contrast (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) or MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Signs or symptoms of recurrence or progression in individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Surveillance for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	For low- or average-risk individuals: • Every 2 months for 2 years, then every 6 months for 10 years, then annually: ◦ MRI Brain without and with contrast (CPT® 70553) • Every 6 months for 2 years: ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) For high- or very high-risk individuals: • Every 2 months for 2 years, then every 6 months for 10 years, then annually: ◦ MRI Brain without and with contrast (CPT® 70553) • Every 3 months for 2 years, then every year for 3 years: ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • For additional imaging guidelines for individuals in long-term follow-up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)**

Evidence Discussion

MRI of the brain and spine with and without contrast is the cornerstone of imaging for medulloblastoma, other CNS embryonal tumors, and pineoblastoma because of its superior sensitivity for detecting primary tumor extent, residual disease, and dissemination throughout the neuraxis. These tumors have a high propensity for cerebrospinal fluid (CSF) spread, making comprehensive neuraxis imaging essential for

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accurate staging and subsequent treatment planning (NCCN, 2026). Early postoperative MRI, ideally within 48 hours, is critical for quantifying residual tumor volume, which is a key factor in risk stratification and influences decisions regarding adjuvant therapy intensity. The benefit of serial MRI during treatment and follow-up is the ability to detect early disease progression or recurrence; however, potential harms include repeated contrast exposure, need for sedation in pediatric patients, and variability in interpretation of post-treatment changes such as pseudoprogression.

Frequent MRI surveillance during and after therapy is supported by the aggressive biology and recurrence patterns of these tumors, particularly within the first 2 years after treatment when recurrence risk is highest. Regular imaging of both brain and spine allows for timely detection of local and metastatic progression, which can inform modifications in therapy or prompt surgical or radiation interventions (NCCN, 2026). In high-risk populations, including those with metastatic disease or residual tumor, more frequent spine imaging improves detection of drop metastases and facilitates earlier treatment. While this intensive imaging approach improves clinical outcomes through earlier detection, it also increases cumulative healthcare utilization and resource burden.

Advanced imaging modalities, including PET brain metabolic imaging and MR spectroscopy, are reserved for specific clinical scenarios where conventional MRI is inconclusive. These modalities provide metabolic and biochemical information that can help distinguish tumor recurrence from treatment-related effects such as radiation necrosis or pseudoprogression, particularly within the first 18 months after radiotherapy (NCCN, 2026). Amino acid PET tracers and MR spectroscopy have demonstrated high sensitivity and specificity in differentiating viable tumor from necrosis, contributing to improved diagnostic confidence and more appropriate clinical decision-making regarding biopsy or treatment escalation. However, limitations include limited availability, variability in interpretation, and the potential for false-positive or false-negative findings, particularly with FDG-PET due to high background uptake in normal brain tissue.

The selective use of CT head without contrast for acute indications, such as evaluation of hemorrhage, hydrocephalus, or shunt complications, balances the need for rapid assessment with the goal of minimizing radiation exposure. CT provides rapid, widely available imaging in emergent settings, complementing MRI when immediate information is required (NCCN, 2026). Overall, the imaging strategy outlined in the clinical criteria reflects a balance between maximizing diagnostic accuracy and minimizing potential harms, using MRI as the primary modality supported by targeted use of CT, PET, and MR spectroscopy to address specific clinical questions and optimize patient management.

Health Equity Considerations

Equitable access to diagnosis and treatment for medulloblastoma, other CNS embryonal tumors, and pineoblastoma is influenced by clinical risk, health system capacity, and

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sociodemographic factors. These tumors require timely multimodal care, including surgery, radiation, and chemotherapy, delivered in specialized centers, and delays in diagnosis or incomplete staging may adversely affect outcomes (Ronsley et al., 2024). Population-based analyses suggest that treatment receipt and modality selection can vary based on nonclinical factors, including insurance status, income, and geographic location. Additional disparities in care delivery include lower likelihood of receiving standard multimodal therapy among patients who are uninsured, from lower education neighborhoods, or younger at diagnosis, with these gaps correlating with worse outcomes (Dressler et al., 2018).

Health equity considerations extend into survivorship and long term management. Survivors of pediatric embryonal CNS tumors are at high risk for neurocognitive and psychosocial sequelae, necessitating ongoing multidisciplinary follow up (Ronsley et al., 2024). However, access to recommended services such as neuropsychological evaluation is uneven, with lower utilization among patients who are Hispanic, live farther from treatment centers, or reside in communities with fewer healthcare resources (Peterson et al., 2025). Neighborhood level factors, including reduced access to health services and socioeconomic opportunity, further contribute to disparities in post treatment care and functional outcomes. Recognition of these multilevel influences, including geographic, socioeconomic, and global resource variability, is critical when assessing imaging utilization, surveillance strategies, and supportive care needs to ensure equitable management across pediatric patients with medulloblastoma, other CNS embryonal tumors, and pineoblastoma.

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Ependymal Tumors (Ependymoma) (ONC-2.5)

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Criteria

- PET Brain Metabolic imaging does not have a defined role in the evaluation of ependymal tumors and therefore considered not medically necessary.
- MR Spectroscopy is not considered medically necessary for routine surveillance of ependymal tumors.
- Individuals with ependymal tumors with a complete resection should be imaged according to surveillance guidelines.
- Individuals with ependymal tumors with incomplete resection or high-risk histology that receive adjuvant radiation therapy should be imaged according to surveillance guidelines after end of radiotherapy imaging.
- RELA-fusion supratentorial ependymoma did not portend worse overall survival outcomes in recent Clinical Oncology Group studies, and is not considered an indication for more frequent surveillance imaging.
- Includes the following tumors:
  - Ependymal tumors
    - Supratentorial ependymoma
    - ZFTA fusion-positive Supratentorial ependymoma
    - YAP1 fusion-positive Posterior fossa ependymoma
    - Posterior fossa ependymoma, group
    - PFA Posterior fossa ependymoma, group PFB

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning in individuals with ependymal tumors	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**

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Indication	Medically Necessary Imaging Study
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed in individuals with ependymal tumors	• MR Spectroscopy (CPT® 76390)
Baseline imaging following resection in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s) (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Completion of radiotherapy in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s) (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Prior to radiotherapy in individuals with ependymal tumors	• MRI of all known sites of measurable disease
Treatment response to induction chemotherapy in individuals with ependymal tumors	Every 2 cycles: • MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s) (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
End of induction chemotherapy and again at end of all therapy in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Prior to second-look surgery in individuals with ependymal tumors	• MRI of all known sites of measurable disease
Signs or symptoms of recurrence, progression, or neurologic emergency in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Surveillance, primary intracranial ependymal tumor and NO history of spinal cord involvement	• MRI Brain without and with contrast (CPT® 70553) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 10 years ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)** • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved annually for 2 years
Surveillance, primary intracranial ependymal tumor AND metastatic cord involvement at diagnosis	• MRI Brain without and with contrast (CPT® 70553) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 10 years ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)** • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 10 years
Surveillance, primary intraspinal ependymal tumor and NO history of intracranial involvement	• MRI without and with contrast of the involved spinal level(s) (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 10 years

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Indication	Medically Necessary Imaging Study
Surveillance, primary intraspinal ependymal tumor AND metastatic intracranial involvement at diagnosis	• MRI of the involved spinal level(s) without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 10 years • MRI Brain without and with contrast (CPT® 70553) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 10 years

Evidence Discussion

MRI of the brain and spine without and with contrast is the primary imaging modality for ependymal tumors because it provides comprehensive evaluation of both the primary tumor and potential dissemination throughout the neuraxis. Ependymomas can involve intracranial and spinal compartments, and staging requires full assessment of the brain and spinal axis to detect metastatic spread and guide treatment planning (NCCN, 2026). The use of MRI for baseline staging, postoperative assessment, and evaluation following radiotherapy supports accurate risk stratification and ensures that residual disease or progression is identified in a timely manner. MRI's high soft tissue resolution allows precise delineation of tumor extent, which is essential for surgical planning and radiation targeting, though it may be limited in distinguishing treatment-related changes from tumor progression in some cases.

Serial MRI during treatment, including assessment every 2 cycles of chemotherapy and at completion of therapy, allows objective evaluation of treatment response and supports clinical decision-making regarding continuation or modification of therapy. Early postoperative imaging is particularly important because extent of resection is a major prognostic factor in ependymoma, and immediate assessment of residual disease informs the need for additional surgery or adjuvant therapy (NCCN, 2026). Similarly, imaging at completion of radiotherapy establishes a new baseline for subsequent surveillance. While frequent imaging improves detection of recurrence or progression, it may also increase cumulative contrast exposure and healthcare utilization, necessitating a balance between diagnostic benefit and resource use.

Surveillance imaging strategies are guided by recurrence patterns, which often occur locally but may also involve the neuraxis. Regular MRI of the primary site and, when appropriate, the entire neuraxis enables early identification of recurrence, particularly during the first few years following treatment when risk is highest (NCCN, 2026). Stratification of surveillance imaging based on initial disease extent (intracranial versus spinal and presence of metastases) ensures that imaging is appropriately focused while

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avoiding unnecessary studies. This targeted approach improves clinical efficiency while maintaining sensitivity for detecting recurrent disease.

Advanced imaging modalities such as PET brain metabolic imaging and MR spectroscopy are not routinely required because conventional MRI provides sufficient anatomic information for most clinical scenarios. While these techniques may offer additional metabolic or biochemical data, their routine use is limited by variability in availability, interpretation, and incremental diagnostic value compared with MRI (NCCN, 2026). Restricting their use to selected problem-solving situations minimizes unnecessary imaging, reduces cost, and avoids potential false-positive findings. Overall, the imaging approach emphasizes MRI as the central modality, with structured timing across the disease continuum to optimize detection of residual disease, treatment response, and recurrence while minimizing unnecessary interventions.

Health Equity Considerations

Equitable diagnosis and management of ependymal tumors, including ependymoma, depend on timely access to specialized neurosurgical care, radiation therapy, and multidisciplinary oncology services. Optimal treatment, centered on maximal safe resection followed by radiation in most cases, requires access to high volume centers with pediatric and neuro oncology expertise, and disparities in these resources may influence outcomes (Coltin et al., 2024; Jagtiani et al., 2024). Population based analyses indicate that socioeconomic and insurance status are associated with differences in care delivery, including prolonged hospital stays among uninsured patients and reduced likelihood of optimal surgical management among lower income populations (Jagtiani et al., 2024). Additional disparities have been observed across racial and demographic groups, such as lower odds of resection among Black patients and differences in treatment utilization by age, which may reflect structural barriers, access to expertise, or referral patterns rather than biologic variation alone (Jagtiani et al., 2024). These findings underscore the importance of equitable referral pathways, access to specialized centers, and consistent application of evidence based treatment protocols.

Social determinants of health, including income, education, insurance status, and geographic location, also affect perioperative outcomes, treatment utilization, and healthcare utilization following diagnosis. Language barriers, cultural differences, and resource availability have been identified as contributors to delays or inequities in care delivery, particularly among Hispanic and underserved populations (Jagtiani et al., 2024). Although overall survival for ependymoma is relatively favorable compared to other CNS tumors, survival differences may still reflect disparities in access to complete resection, radiation therapy, and longitudinal care rather than differences in tumor biology alone (Coltin et al., 2024; Jagtiani et al., 2024). Addressing these barriers requires system level interventions to ensure equitable access to surgical expertise, radiation facilities, and supportive oncology services.

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Health equity considerations extend beyond initial treatment to survivorship, where long term morbidity is substantial and disproportionately impacts patients with limited access to ongoing care. Survivors of childhood ependymoma experience significantly higher risks of chronic health conditions, including stroke, hearing loss, hospitalization, disability, and need for homecare services compared to the general population (Coltin et al., 2024). These long term outcomes necessitate sustained access to multidisciplinary surveillance and rehabilitation services, which may be variably available across regions and populations. Socioeconomic factors, including neighborhood income and access to healthcare infrastructure, likely influence the ability to obtain these services and may contribute to disparities in functional outcomes and quality of life. Consideration of these multilevel factors, including access to specialized care, socioeconomic barriers, and long term support resources, is essential in the imaging, surveillance, and management of patients with ependymal tumors to promote equitable outcomes across diverse patient populations.

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Central Nervous System Germ Cell Tumors (ONC-2.6)

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- Central nervous system germ cell tumor imaging indications in adult individuals are identical to those for pediatric individuals. See: **CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT) (PEDONC-4.7)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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CNS Lymphoma (Also Known as Microglioma) (ONC-2.7)

ON.CN.0002.7.A
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Criteria

Indication	Medically Necessary Imaging Study
Initial staging of CNS lymphoma	ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • MRI Cervical Spine without and with contrast (CPT® 72156) • MRI Thoracic Spine without and with contrast (CPT® 72157) • MRI Lumbar Spine without and with contrast (CPT® 72158)
Extra-neural evaluation to confirm CNS primary *Individuals with CNS Lymphoma that is metastatic should be imaged according to: • **Non-Hodgkin Lymphomas (ONC-27)** for individuals 19 years of age or older • **Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) (PEDONC-5.3)** in the Pediatric Oncology Imaging Guidelines for individuals under the age of 19	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • PET/CT (CPT® 78815) for evaluation of inconclusive findings on CT imaging
Treatment response in individuals with CNS lymphoma	• MRI without and with contrast of all positive disease sites every 2 cycles

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Indication	Medically Necessary Imaging Study
Suspected intracranial or intraspinal recurrence in individuals with CNS lymphoma	• All imaging considered medically necessary for initial staging
Surveillance in individuals with CNS lymphoma	• For all individuals: MRI Brain (CPT® 70553) without and with contrast every 2-3 months for 2 years, then every 6 months to year 5, then annually thereafter • In individuals with a history of leptomeningeal disease, the following may be approved in addition to MRI Brain every 2-3 months for 2 years, then every 6 months to year 5, then annually thereafter: ◦ MRI Spine without and with contrast (CPT® 72156, 72157, and/or 72158)

Background and Supporting Information

Primary central nervous system lymphoma, historically referred to as microglioma, is a rare and aggressive form of non-Hodgkin lymphoma confined to the central nervous system, including the brain, spinal cord, cranial nerves, leptomeninges, cerebrospinal fluid, and eyes. The majority of cases represent diffuse large B cell lymphoma arising within immune privileged CNS compartments and occur in both immunocompetent and immunocompromised individuals (Grommes et al., 2018; Louis et al., 2021).

Primary central nervous system lymphoma accounts for approximately 4% of all intracranial malignancies and is characterized by a highly infiltrative growth pattern with a strong predilection for periventricular white matter, deep gray structures, and the corpus callosum. Unlike most primary brain tumors, PCNSL is highly sensitive to chemotherapy and radiation therapy, making accurate diagnosis and staging essential for optimal management (Grommes et al., 2018).

Evidence Discussion

Imaging recommendations for CNS lymphoma are designed to ensure complete assessment of disease extent while distinguishing primary CNS involvement from secondary systemic lymphoma. MRI of the brain without and with contrast is essential for identifying characteristic parenchymal lesions, defining disease burden, and guiding biopsy. Whole-spine MRI with contrast is justified at initial staging given the documented, though often clinically silent, potential for leptomeningeal and spinal

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involvement, which significantly impacts prognosis and treatment planning (Grommes et al., 2018; NCCN, 2026).

Confirmation that lymphoma is confined to the CNS requires extra-neural evaluation. CT of the chest, abdomen, and pelvis with contrast is supported by evidence demonstrating that a subset of patients initially suspected of having PCNSL are ultimately found to have systemic lymphoma with CNS involvement. FDG-PET/CT is reserved for cases with inconclusive CT findings, reflecting its limited incremental yield and the need to balance diagnostic benefit against radiation exposure (Grommes et al., 2018; NCCN, 2026).

Serial MRI assessment during treatment provides a noninvasive means to evaluate therapeutic response in a tumor that is highly chemosensitive yet prone to relapse. Imaging after every two cycles of therapy allows early identification of refractory disease or progression, facilitating timely modification of treatment strategies. Repeating all staging imaging in cases of suspected recurrence is supported by evidence that relapses are frequently multifocal and confined to the CNS compartment (Grommes et al., 2018).

Surveillance imaging intervals reflect the aggressive natural history of CNS lymphoma, with most relapses occurring within the first two years after diagnosis. MRI surveillance strategies stratified by prior parenchymal versus leptomeningeal involvement are supported by long-term outcome data demonstrating ongoing risk of recurrence even years after initial remission. Limiting surveillance to MRI of previously involved sites reduces unnecessary testing while maintaining sensitivity for clinically meaningful disease recurrence (Grommes et al., 2018; NCCN, 2026).

Health Equity Considerations

Primary central nervous system lymphoma is an aggressive and neurologically morbid malignancy for which timely diagnosis and accurate imaging assessment are central to treatment selection and outcome monitoring. Population-based analyses demonstrate that socioeconomic disadvantage is independently associated with worse overall and cancer-specific survival in primary central nervous system lymphoma, even after adjustment for clinical factors (Deng et al., 2022). Individuals residing in more deprived areas are less likely to receive standard-of-care therapies and more likely to have comorbid conditions, including HIV, that may complicate diagnostic evaluation and longitudinal imaging assessment (Deng et al., 2022). These disparities underscore the importance of consistent application of evidence-based imaging strategies to facilitate early diagnosis, accurate disease characterization, and timely initiation of appropriate therapy across diverse populations.

Health system–level factors further contribute to inequities in primary central nervous system lymphoma management and imaging utilization. Real-world data indicate that individuals treated in safety-net hospital settings, who are more often uninsured,

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from racial and ethnic minority groups, or living with HIV, are less likely to receive intensive treatment regimens and experience differences in diagnostic and surveillance imaging pathways, reflecting resource constraints and access limitations (Patel et al., 2022). Given the reliance on MRI for diagnosis, treatment planning, and response assessment in primary central nervous system lymphoma, variability in access to guideline-concordant imaging may amplify existing disparities in care and outcomes. Awareness of these structural and socioeconomic factors is essential when implementing imaging guidelines, supporting more equitable diagnostic evaluation, disease monitoring, and treatment assessment across varied care settings (Deng et al., 2022; Patel et al., 2022).

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Meningiomas (Intracranial and Intraspinal) (ONC-2.8)

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Criteria

Indication	Medically Necessary Imaging Study
Inconclusive MRI Brain or CT Head and further imaging is needed to confirm diagnosis of meningioma	• Dotatate PET/CT Brain (CPT® 78814)
Initial staging of intra**cranial** meningioma	ANY or ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • CT Head (contrast as requested)
Initial staging of intra**spinal** meningioma	ONE of the following: • MRI without and with contrast of appropriate spinal region (Cervical CPT® 72156, Thoracic CPT® 72157, and Lumbar CPT® 72158) OR • CT without and with contrast of the appropriate spinal region (Cervical CPT® 72127, Thoracic CPT® 72130, and Lumbar CPT® 72133)
Treatment response in individuals with meningioma	Every 2 cycles: • MRI Brain without and with contrast (CPT® 70553) • MRI without and with contrast of appropriate spinal region (Cervical CPT® 72156, Thoracic CPT® 72157, and Lumbar CPT® 72158) • MRI without and with contrast of all otherpositive disease sites

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Indication	Medically Necessary Imaging Study
Suspected recurrence of intracranial or intraspinal disease	ANY or ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • CT Head (contrast as requested) AND ONE of the following: • MRI without and with contrast of appropriate spinal region (Cervical CPT® 72156, Thoracic CPT® 72157, and Lumbar CPT® 72158) OR • CT without and with contrast of the appropriate spinal region (Cervical CPT® 72127, Thoracic CPT® 72130, and Lumbar CPT® 72133)
Suspected recurrence of meningioma with inconclusive findings on MRI	Any ONE of the following studies: • Octreotide SPECT Brain (CPT® 78803) • Octreotide SPECT/CT Brain (CPT® 78830) • Dotatate PET/CT Brain (CPT® 78814) • PET/MRI Brain (CPT® 78811 and 76498)
Post-operatively for resected or partially resected intra**cranial** meningiomas irrespective of grade	In addition to the imaging listed below: • MRI Brain without and with contrast (CPT® 70553) at 24-48 hours after surgical intervention
Surveillance for Grade I (low-grade), completely resected intra**cranial** meningiomas	Annual MRI Brain without and with contrast (CPT® 70553) followed by discontinuation of surveillance if there is no recurrence after 11 years
Surveillance for Grade I (low-grade), or unspecified Grade intra**cranial** meningioma (partially resected and unresected)	• MRI Brain without and with contrast (CPT® 70553) at 1, 3, and 6 months, then every 6 months for 5 years, then annually up to 11 years
Surveillance for Grade II (atypical), completely resected intra**cranial** meningiomas	MRI Brain without and with contrast (CPT® 70553) annually indefinitely
Surveillance for Grade II (atypical) intra**cranial** meningioma (partially resected and unresected)	• MRI Brain without and with contrast (CPT® 70553) at 1, 3, and 6 months, then every 6 months for 5 years, then annually indefinitely

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Indication	Medically Necessary Imaging Study
Surveillance for Grade III (malignant or anaplastic) intra**cranial** meningioma	MRI Brain without and with contrast (CPT® 70553) every 2 months for 3 years, and then every 3 months indefinitely
Surveillance for Grade I (low-grade), completely resected intra**spinal** meningiomas	MRI of the involved spinal level without and with contrast [ANY of the following: (CPT® 72156 [Cervical spine], CPT® 72157 [Thoracic spine], CPT® 72158 [Lumbar spine])] or CT of the involved spinal level without and with contrast [ANY of the following: (CPT® 72127 [Cervical spine], CPT® 72130 [Thoracic spine], CPT® 72133 [Lumbar spine])] annually followed by discontinuation of surveillance if there is no recurrence after 11 years
Surveillance for Grade II (atypical), completely resected intra**spinal** meningiomas	MRI of the involved spinal level without and with contrast [ANY of the following: (CPT® 72156 [Cervical spine], CPT® 72157 [Thoracic spine], CPT® 72158 [Lumbar spine])] or CT of the involved spinal level without and with contrast [ANY of the following: (CPT® 72127 [Cervical spine], CPT® 72130 [Thoracic spine], CPT® 72133 [Lumbar spine])] annually indefinitely
Surveillance for Grade I (low-grade), and Grade II (atypical) or unspecified Grade intra**spinal** meningioma (partially resected and unresected)	ONE of the following at 3, 6, and 12 months, and then every 6 months for 5 years, then 1-3 years thereafter as requested: • MRI without and with contrast (CPT® 72156 [Cervical spine], CPT® 72157 [Thoracic spine], CPT® 72158 [Lumbar spine]) of the involved spinal level OR • CT without and with contrast (CPT® 72127 [Cervical spine], CPT® 72130 [Thoracic spine], CPT® 72133 [Lumbar spine]) of the involved spinal level

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Indication	Medically Necessary Imaging Study
Surveillance for Grade III (malignant or anaplastic) intra**spinal** meningioma	MRI of the involved spinal level without and with contrast [ANY of the following: (CPT® 72156 [Cervical spine], CPT® 72157 [Thoracic spine], CPT® 72158 [Lumbar spine])] or CT of the involved spinal level without and with contrast [ANY of the following: (CPT® 72127 [Cervical spine], CPT® 72130 [Thoracic spine], CPT® 72133 [Lumbar spine])] every 3-4 months for 2 years, and then every 6 months indefinitely

Background and Supporting Information

Meningiomas are the most common primary tumors of the central nervous system, accounting for approximately one third of all primary intracranial and intraspinal neoplasms. These tumors are extra axial and arise from arachnoid cap cells of the meninges, occurring throughout the neuroaxis, including the cranial and spinal compartments. Meningiomas are classified by the World Health Organization (WHO) into three histologic grades, Grade I (benign), Grade II (atypical), and Grade III (anaplastic or malignant), which correlate with risks of recurrence and aggressive behavior (Maas et al., 2021; NCCN, 2026).

Evidence Discussion

Imaging recommendations for meningiomas aim to balance comprehensive disease assessment with avoidance of unnecessary imaging burden. MRI without and with contrast is the cornerstone of diagnosis and follow-up, providing high sensitivity for soft-tissue characterization and detection of residual or recurrent disease. CT imaging is justified in selected cases due to the frequent involvement of adjacent bone, where CT offers superior depiction of hyperostosis and osseous infiltration that may influence surgical planning and response assessment (NCCN, 2026).

Meningiomas demonstrate high expression of somatostatin receptor subtype 2, providing a biologic basis for functional imaging with radiolabeled somatostatin analogs. Techniques such as ^{68}Ga-DOTATATE PET/CT and octreotide-based SPECT imaging have emerged as useful adjuncts for problem-solving in cases with inconclusive conventional imaging or suspected recurrence, particularly in complex postoperative or post-radiation settings. Restricting these modalities to scenarios with diagnostic uncertainty limits unnecessary radiation exposure and avoids downstream overdiagnosis while preserving their high specificity for meningioma tissue (Galldiks et al., 2017; Huntoon et al., 2020).

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Surveillance imaging intervals are guided by tumor grade, anatomic site, and extent of resection due to the variable natural history of meningiomas. Low-grade tumors demonstrate relatively slow growth but maintain long-term recurrence risk, supporting prolonged but gradually spaced surveillance. In contrast, Grade II and III meningiomas carry substantially higher recurrence rates, including late recurrence after complete resection, justifying more frequent and often indefinite imaging follow-up to enable early detection of progression (Maas et al., 2021; NCCN, 2026).

Emerging molecular risk stratification highlights that histologic grade alone does not fully capture recurrence risk, particularly for Grade I and II tumors. Integrated molecular-morphologic models provide improved prognostic discrimination and support individualized follow-up strategies. However, imaging surveillance remains the primary noninvasive method for monitoring disease behavior, and adherence to structured imaging intervals ensures timely identification of clinically meaningful recurrence while minimizing cumulative imaging harms (Maas et al., 2021).

Health Equity Considerations

Meningiomas demonstrate well-documented variation in incidence, clinical presentation, and outcomes across racial, ethnic, and socioeconomic groups, with important implications for diagnostic imaging. Population-based and institutional studies consistently show higher incidence rates among Black individuals, who are also more likely to present with symptomatic disease, peritumoral edema, and diagnoses made through emergent care settings rather than planned outpatient evaluation (Jackson et al., 2022; Li et al., 2025; Pugazenthi et al., 2024). Lower socioeconomic status at the individual or county level has been associated with delayed diagnosis and more advanced clinical or radiographic presentation, suggesting inequities in access to routine care and early neuroimaging (Jackson et al., 2022; Pugazenthi et al., 2024). These differences may influence the urgency, modality, and extent of imaging evaluation, including the need for advanced MRI techniques to accurately assess tumor burden, mass effect, and involvement of adjacent structures.

Access-related and structural factors further contribute to disparities in imaging utilization and longitudinal surveillance for individuals with meningiomas. Evidence indicates that patients from lower socioeconomic backgrounds and those who are publicly insured or reside in resource-limited settings are less likely to receive timely specialty referral and consistent follow-up imaging, which may delay detection of tumor growth, progression, or recurrence (Lei et al., 2023; Pugazenthi et al., 2024). Systematic reviews and epidemiologic analyses suggest that these disparities persist even after accounting for tumor characteristics and treatment factors, highlighting the role of health system-level barriers in care delivery (Lei et al., 2023; Li et al., 2025). Consistent application of evidence-based imaging criteria is therefore essential to support equitable diagnosis, monitoring, and treatment planning for both intracranial and intraspinal meningiomas, particularly for populations at increased risk of delayed presentation,

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fragmented surveillance, or under-assessment of disease progression (Jackson et al., 2022; Lei et al., 2023).

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Spinal Cord Tumors (Benign and Malignant) (ONC-2.9)

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- See: **Low Grade Gliomas (ONC-2.2)** and **High Grade Gliomas (ONC-2.3)** for imaging guidelines of low-grade and high-grade gliomas of the spinal cord
- See: **Malignant Tumors of the Spinal Cord (PEDONC-4.9)** in the Pediatric and Special Populations Oncology Imaging Guidelines for other malignant spinal cord tumors
- See: in the Pediatric and Special Populations Oncology Imaging Guidelines for spinal tumors in individuals with Neurofibromatosis 1 or 2
- See: **Spinal/Vertebral Metastases (ONC-31.6)** for known secondary malignancy involving the spine/spinal canal/spinal cord

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Choroid Plexus Tumors (ONC-2.10)

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- Choroid Plexus Tumor imaging indications in adult individuals are identical to those for pediatric individuals. See: **Choroid Plexus Tumors (PEDONC-4.13)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck (ONC-3)

Guideline

Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – General Considerations (ONC-3.0)
Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Suspected/Diagnosis (ONC-3.1)
Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Initial Work-up/Staging (ONC-3.2)
Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Restaging/Recurrence (ONC-3.3)
Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Surveillance/Follow-up (ONC-3.4)
References (ONC-3)

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Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – General Considerations (ONC-3.0)

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Criteria

- Individuals with esthesioneuroblastoma should be imaged according to this guideline section.

Background and Supporting Information

Squamous cell carcinomas of the head and neck (HNSCC) arise from the mucosal epithelium of the upper aerodigestive tract, including the oral cavity, oropharynx, hypopharynx, larynx, nasopharynx, and sinonasal cavities. Histologically distinct tumors such as esthesioneuroblastoma share anatomic overlap and patterns of local extension and nodal spread and are therefore evaluated using the same general imaging framework. Accurate anatomic delineation of primary tumor extent and regional nodal involvement is essential for clinical staging and treatment planning (NCCN, 2026).

Clinical staging of HNSCC incorporates tumor size, depth of invasion, anatomic spread, and regional lymph node involvement. Stage III and IV disease encompasses tumors larger than 4cm and/or those with documented regional lymph node metastases, reflecting a higher risk of locoregional failure and distant spread. These stages are associated with increased likelihood of multimodality therapy and a greater need for comprehensive baseline imaging (NCCN, 2026).

Health Equity Considerations

Squamous cell carcinomas of the head and neck (HNSCC) demonstrate substantial and well-documented disparities in stage at diagnosis, tumor biology, and clinical outcomes across racial, socioeconomic, and geographic populations. Lower socioeconomic status, lack of insurance coverage, and rural residence are consistently associated with delayed diagnosis and more advanced disease at presentation, increasing the likelihood that initial imaging occurs in urgent or emergent settings rather than through timely, planned diagnostic evaluation (Marrero-Gonzalez & Graboyes, 2024; Baliga et al., 2023). Black

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patients are disproportionately affected by advanced-stage and HPV-negative disease and experience longer diagnostic and treatment intervals compared with White patients, factors that may influence staging completeness, selection of initial imaging modalities, and overall care trajectories (Baliga et al., 2023; Lin et al., 2024). These disparities highlight the importance of standardized imaging approaches to support accurate staging and equitable care delivery at the point of diagnosis.

Structural barriers to specialty care further contribute to inequities in imaging utilization and longitudinal surveillance among patients with HNSCC. Neighborhood-level socioeconomic disadvantage has been associated with worse survival outcomes and lower likelihood of receiving timely, guideline-concordant diagnostic imaging and post-treatment surveillance, including cross-sectional imaging and PET/CT for nodal assessment and response evaluation (Benjamin et al., 2025; Marrero-Gonzalez & Graboyes, 2024). Differences in access to high-volume centers and multidisciplinary care may further exacerbate variation in imaging follow-up and recurrence detection across populations (Lin et al., 2024). Consistent application of evidence-based imaging criteria, including appropriate use of CT, MRI, and PET/CT for staging and surveillance, supports health equity by promoting diagnostic accuracy and longitudinal disease monitoring regardless of race, socioeconomic status, or geographic location (Benjamin et al., 2025; Marrero-Gonzalez & Graboyes, 2024).

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Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Suspected/Diagnosis (ONC-3.1)

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Criteria

- See: **Neck Masses - Imaging (NECK-5.1)** in the Neck Imaging Guidelines for evaluation of suspected malignancy in the neck.
- PET is considered medically necessary prior to biopsy in individuals with suspected squamous cell carcinomas of the head and neck in order to determine a more favorable site for biopsy when:
  - a prior biopsy was nondiagnostic or
  - a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt

Background and Supporting Information

Squamous cell carcinomas of the head and neck (HNSCC) arise from the mucosal epithelium of the upper aerodigestive tract and frequently present with nonspecific symptoms such as persistent neck mass, mucosal lesion, dysphagia, hoarseness, or unexplained pain. At initial presentation, the primary tumor may be occult, and cervical lymphadenopathy is often the first or only clinical finding. Accurate imaging evaluation is therefore central to identifying the primary site, defining disease extent, and guiding diagnostic procedures (NCCN, 2026).

Evidence Discussion

The diagnostic imaging approach for suspected HNSCC is supported by evidence demonstrating that early and accurate anatomic assessment improves identification of the primary tumor and regional nodal disease. Evidence supports the use of PET prior to biopsy in cases of nondiagnostic prior biopsy or when biopsy would otherwise require extensive surgical intervention. By identifying the most metabolically active site, PET imaging increases the likelihood of diagnostic success and reduces the need for repeated invasive procedures, thereby limiting patient risk (NCCN, 2026).

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Limiting PET use to these specific situations avoids unnecessary radiation exposure and false positive findings that may complicate diagnosis. Routine use of PET prior to biopsy in all suspected HNSCC cases has not demonstrated additional benefit and may increase downstream testing. Targeted application of PET aligns diagnostic benefit with patient safety and evidence based resource utilization (NCCN, 2026).

Overall, the clinical imaging criteria for suspected HNSCC reflect a balance between thorough diagnostic evaluation and avoidance of procedural harm. Imaging guided biopsy planning improves diagnostic efficiency, reduces morbidity associated with repeat or extensive surgical biopsies, and supports timely initiation of appropriate therapy once a histologic diagnosis is established (NCCN, 2026).

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Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Initial Work-up/Staging (ONC-3.2)

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Criteria

Indication	Medically Necessary Imaging Study
All stages of disease in individuals with squamous cell carcinomas of the head and neck	• CT Neck with contrast (CPT® 70491) **or** MRI Orbits/Face/Neck (OFN) without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)
For sentinel lymph node evaluation when nodes are not clinically positive in individuals with squamous cell carcinomas of the head and neck	• Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
Nasal cavity and paranasal sinuses (bony erosion or skull base and intracranial involvement) in individuals with squamous cell carcinomas of the head and neck	ONE of the following: • CT Maxillofacial with contrast (CPT® 70487) • CT Neck with contrast (CPT® 70491) • MRI Orbits/Face/Neck without and with contrast (CPT® 70543)

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Indication	Medically Necessary Imaging Study
Nasopharyngeal (NPC) Cancer	• PET/CT (CPT® 78815) • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is the preferred study ◦ CT Neck (CPT® 70491) **and/or** CT Maxillofacial (CPT® 70487) with contrast if contraindication to MRI • CT Chest with contrast (CPT® 71260)
For ANY of the following in individuals with squamous cell carcinomas of the head and neck: • Known stage III or IV disease • To determine role for upfront surgery vs chemoradiation in T3-T4 size tumor • Prior to start of primary chemoradiotherapy and have not undergone definitive surgical resection • Inconclusive findings on conventional imaging (CT, MRI) • In order to direct laryngoscopy/exam under anesthesia for biopsy • Pulmonary nodule(s) 8mm or greater in size • Cervical lymph node biopsy positive for squamous cell carcinoma and no primary site identified on CT or MRI Neck and Chest • Inconclusive findings suggestive of disease outside the head and neck area	• PET/CT (CPT® 78815)
Signs or symptoms of abdominal metastatic disease including, but not limited to, elevated liver function tests in individuals with squamous cell carcinomas of the head and neck	• CT Abdomen with contrast (CPT® 74160)

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Indication	Medically Necessary Imaging Study
Any head and neck cancer with neurological findings or suspicion of skull base invasion	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Squamous cell carcinomas of the head and neck (HNSCC) originate from the mucosal surfaces of the upper aerodigestive tract and encompass tumors of the oral cavity, pharynx, larynx, nasopharynx, and sinonasal spaces. Initial clinical staging is based on tumor size and extent, regional nodal involvement, and the presence or absence of distant metastatic disease. Accurate determination of disease stage at presentation is essential for prognostication and selection of appropriate local, regional, and systemic treatment strategies (NCCN, 2026).

Evidence Discussion

Accurate initial staging imaging is supported by evidence demonstrating improved treatment planning and avoidance of inappropriate or ineffective therapies. Contrast-enhanced CT or MRI of the neck provides essential anatomic detail for defining tumor extent and nodal disease, which directly impacts surgical resectability, the need for neck dissection, and radiation target volumes. Reliance on high-quality anatomic imaging minimizes understaging and reduces the risk of locoregional failure (Gule-Monroe et al., 2017; NCCN, 2026).

Evaluation for distant metastatic disease is guided by tumor stage, clinical features, and subsite-specific risk. Chest imaging identifies pulmonary metastases and second primary lung cancers, which occur in a meaningful proportion of patients at diagnosis and substantially alter management. Limiting abdominal imaging to individuals with suggestive clinical findings reflects the low prevalence of abdominal metastases and reduces unnecessary radiation exposure and false-positive findings (Awan et al., 2017; NCCN, 2026).

FDG-PET/CT improves detection of occult nodal disease and distant metastases in patients with stage III or IV disease and in those with equivocal findings on CT or MRI. Evidence supports PET/CT for identifying metabolically active disease that may not be apparent on anatomic imaging alone and for localizing primary tumor sites in cases of cervical nodal metastases with no identifiable primary on conventional studies. However, PET lacks sufficient anatomic resolution for accurate local "T" staging and is therefore used as an adjunct rather than a stand-alone modality (Moeller et al., 2009; Lowe et al., 2019; NCCN, 2026).

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Restricting advanced imaging to defined clinical scenarios balances diagnostic benefit against potential harms, including radiation exposure, incidental findings, and unnecessary downstream procedures. Large observational studies demonstrate that indiscriminate imaging does not improve outcomes and may increase morbidity from false-positive results. The initial staging approach outlined in the clinical criteria aligns imaging intensity with disease risk, supporting high diagnostic yield while minimizing avoidable patient harm (Chen et al., 2023; Heineman et al., 2017; NCCN, 2026).

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Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Restaging/Recurrence (ONC-3.3)

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Criteria

Indication	Medically Necessary Imaging Study
Following primary chemoradiotherapy or radiation therapy or resection or any combination of these modalities in individuals with squamous cell carcinomas of the head and neck	ONE of the following: • CT Neck with contrast (CPT® 70491); **or** • MRI Orbits/Face/Neck without and with contrast (CPT® 70543); **or** • PET/CT (CPT® 78815) no sooner than 12 weeks (3 months) post completion of radiation therapy ◦ If post-treatment PET/CT scan is negative, further surveillance imaging is not considered medically necessary
Post-treatment PET is positive for residual disease in individuals with squamous cell carcinomas of the head and neck	ONE of the following: • CT Neck with contrast (CPT® 70491); **or** • MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
Post-treatment PET is equivocal for residual disease in individuals with squamous cell carcinomas of the head and neck	PET/CT (CPT® 78815) 3-6 months from prior post-treatment PET/CT

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Indication	Medically Necessary Imaging Study
Induction chemotherapy response in individuals with squamous cell carcinomas of the head and neck	• CT Neck with contrast (CPT® 70491) or MRI Orbits/ Face/Neck without and with contrast (CPT® 70543) • PET is not considered medically necessary to assess response to induction chemotherapy
Concern for progression seen on imaging performed at completion of induction chemotherapy in individuals with squamous cell carcinomas of the head and neck	EITHER or ALL of the following: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • PET/CT (CPT® 78815)
Measurable or metastatic disease undergoing active treatment in individuals with squamous cell carcinomas of the head and neck	Every 2 cycles (6-8 weeks): • CT Neck with contrast (CPT® 70491) OR • MRI Orbits/ Face/Neck without and with contrast (CPT® 70543) AND • CT with contrast of involved body sites
Suspected local recurrence in individuals with squamous cell carcinomas of the head and neck	• CT Neck with contrast (CPT® 70491) or MRI Orbits/ Face/Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260)
Biopsy proven local recurrence in individuals with squamous cell carcinomas of the head and neck	ONE of the following: • PET/CT (CPT® 78815) **or** • CT Neck with contrast (CPT® 70491) or MRI Orbits/ Face/Neck without and with contrast (CPT® 70543) and CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)

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Indication	Medically Necessary Imaging Study
Inconclusive conventional imaging (CT or MRI) in individuals with squamous cell carcinomas of the head and neck	• PET/CT (CPT® 78815)
If suspected non-response while on treatment in individuals with squamous cell carcinomas of the head and neck	• An additional CT Neck with contrast (CPT 70491) or MRI Orbits/Face/Neck without and with contrast (CPT 70543)
Any of the following in individuals with squamous cell carcinomas of the head and neck: • Known prior thoracic disease • New or worsening pulmonary symptoms • New or worsening chest x-ray findings	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)

Background and Supporting Information

Restaging and evaluation for recurrence in squamous cell carcinomas of the head and neck (HNSCC) are integral components of post treatment management. Following surgery, radiation therapy, chemoradiotherapy, or combinations of these modalities, imaging is used to assess response to therapy, establish a new post treatment baseline, and identify residual or recurrent disease. Interpretation of post treatment imaging requires careful attention to expected anatomic and inflammatory changes related to therapy (NCCN, 2026).

Patterns of failure in HNSCC include local recurrence at the primary tumor site, regional cervical nodal recurrence, and distant metastases, most commonly involving the lungs and mediastinum. The risk of recurrence is highest within the first two to three years after treatment completion, particularly in individuals with advanced stage disease, extranodal extension, or incomplete response to therapy. Imaging strategies therefore emphasize early post treatment assessment followed by symptom directed evaluation thereafter (NCCN, 2026; Awan et al., 2017).

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Evidence Discussion

Follow-up imaging after definitive treatment for HNSCC is supported by evidence demonstrating its value in evaluating treatment response and guiding subsequent management. In individuals treated with primary chemoradiotherapy without surgical resection, FDG-PET/CT performed no earlier than 12 weeks after completion of radiation provides high diagnostic accuracy for residual disease. Studies show that a negative PET/CT at the 3–6-month interval is associated with a negative predictive value of approximately 95%–97% for locoregional recurrence, supporting discontinuation of routine surveillance imaging in asymptomatic individuals with negative findings (Moeller et al., 2009; Lowe et al., 2019; NCCN, 2026).

PET/CT performed earlier than this interval is associated with a high false-positive rate due to post-treatment inflammation and tissue remodeling, leading to unnecessary biopsies and interventions. For this reason, contrast-enhanced CT or MRI may be used as alternatives when PET is contraindicated, though these modalities generally add limited incremental value when a properly timed PET/CT is negative. Restricting PET use to optimal timeframes balances diagnostic benefit against the harms of false-positive findings and excess radiation exposure (NCCN, 2026; Marcus et al., 2025).

During induction chemotherapy and active treatment for measurable or metastatic disease, serial cross-sectional imaging every two cycles is supported to assess response and detect progression. PET is not routinely recommended for response assessment during induction chemotherapy because anatomic imaging provides sufficient information to guide treatment decisions, and metabolic changes may be difficult to interpret in the setting of ongoing therapy (Gule-Monroe et al., 2017; NCCN, 2026).

For suspected recurrence, CT or MRI of the primary site and CT of the chest are supported due to the frequency of asymptomatic pulmonary and mediastinal metastases at relapse. PET/CT is reserved for cases with biopsy-proven recurrence or inconclusive conventional imaging, as inflammatory changes following treatment contribute to reduced specificity. This stepwise approach maximizes diagnostic accuracy while minimizing unnecessary imaging, invasive procedures, and downstream harm (Awan et al., 2017; Chen et al., 2023; Heineman et al., 2017).

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Squamous Cell Carcinomas, Esthesioneuroblastoma, and Undifferentiated Carcinomas of the Head and Neck – Surveillance/Follow-up (ONC-3.4)

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Criteria

Indications	Medically Necessary Imaging Study
If post-resection (with or without post-operative radiation therapy) CT or MRI imaging shows residual abnormalities in individuals with squamous cell carcinomas of the head and neck	ONE of the following, once within 6 months of prior imaging: • CT Neck with contrast (CPT® 70491) OR • MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
Individuals with squamous cell carcinomas of the head and neck treated with definitive radiotherapy	• A second PET/CT (CPT® 78815) is considered medically necessary at least 6 months after completion of therapy (i.e., 3 months from the prior PET)
Individuals with squamous cell carcinomas of the head and neck treated with definitive radiation therapy or combined chemoradiation, and 6-month PET imaging is negative	Further surveillance imaging is not routinely considered medically necessary

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Indications	Medically Necessary Imaging Study
After initial post-treatment study, for ANY of the following in individuals with squamous cell carcinomas of the head and neck: • Nasopharyngeal primary site • Difficult physical exam due to the effects of treatment (e.g., scarring, etc.) or unable to visualize deep-seated primary site	Annually for 3 years: • CT Neck with contrast (CPT® 70491) **or** MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
• CT Chest is not considered medically necessary for surveillance. Individuals with squamous cell carcinomas of the head and neck with a smoking history may undergo annual low dose CT cancer screening if criteria are met (See: **Lung Cancer Screening (CH-33)** in the Chest Imaging Guidelines)	

Background and Supporting Information

Surveillance following definitive treatment of squamous cell carcinomas of the head and neck (HNSCC) is intended to detect clinically significant recurrence while minimizing unnecessary imaging and associated harms. After completion of surgery, radiation therapy, chemoradiation, or combined modalities, most individuals undergo an initial post-treatment imaging assessment to establish a baseline against which future changes can be compared. Subsequent imaging decisions are guided by clinical findings, tumor subsite, and the ability to adequately assess the primary site on physical examination (NCCN, 2026).

The majority of recurrences in HNSCC occur within the first three years after treatment, with the highest risk in the initial 6–12 months. Local and regional failures predominate, although distant metastases can occur, particularly in individuals with advanced initial stage disease or aggressive tumor biology. Surveillance strategies therefore emphasize early post treatment assessment followed by selective, problem focused imaging rather than routine long term scanning in asymptomatic individuals (Awan et al., 2017; NCCN, 2026).

Evidence Discussion

Evidence supporting surveillance imaging in HNSCC demonstrates greatest benefit in the early post-treatment period, when detection of residual or early recurrent disease may influence salvage therapy and prognosis. FDG-PET/CT performed 3–6 months after completion of definitive radiotherapy or chemoradiation has been shown to have a very high negative predictive value, allowing clinicians to safely discontinue routine

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imaging in asymptomatic individuals with negative results. Performing additional imaging earlier than this window increases false-positive findings due to post-treatment inflammation and does not improve outcomes (Moeller et al., 2009; Lowe et al., 2019; NCCN, 2026).

There is no high-quality prospective evidence demonstrating a survival advantage for long-term routine surveillance imaging compared with careful clinical follow-up alone. Observational data show similar disease-free survival between individuals undergoing scheduled imaging surveillance and those followed primarily with clinical examination, supporting a limited and selective imaging strategy after initial post-treatment assessment (Heineman et al., 2017; Chen et al., 2023).

Selective use of CT or MRI within six months of prior imaging is supported when residual abnormalities are present on post-resection imaging, as progressive or resolving changes may alter management. Additionally, individuals with nasopharyngeal primary tumors or those with anatomic limitations to physical examination benefit from periodic cross-sectional imaging during the first three years, when the vast majority of recurrences occur (Awan et al., 2017; NCCN, 2026).

Routine CT chest imaging for surveillance of distant metastases is not supported due to low yield and lack of demonstrated outcome benefit. Lung metastases and second primary lung cancers are more effectively addressed through symptom-driven evaluation or established lung cancer screening pathways in individuals who meet smoking-related risk criteria. Limiting imaging to scenarios with proven benefit aligns surveillance practice with evidence-based risk–benefit considerations and reduces cumulative patient harm (Gule-Monroe et al., 2017; Chen et al., 2023).

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Salivary Gland Cancers (ONC-4)

Guideline

Salivary Gland Cancers – Suspected/Diagnosis (ONC-4.1)
Salivary Gland Cancers – Initial Work-up/Staging (ONC-4.2)
Salivary Gland Cancers – Restaging/Recurrence (ONC-4.3)
Salivary Gland Cancers – Surveillance/Follow-up (ONC-4.4)
References (ONC-4)

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Salivary Gland Cancers – Suspected/ Diagnosis (ONC-4.1)

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Criteria

- See: **Salivary Gland Disorders (NECK-11)** and **Neck Masses – Imaging (NECK-5.1)** in the Neck Imaging Guidelines for evaluation of salivary gland masses, salivary gland stones, and neck masses.

Background and Supporting Information

Salivary gland cancers are rare, morphologically and clinically diverse malignancies arising from the major salivary glands (parotid, submandibular, sublingual) or from numerous minor salivary glands distributed throughout the oral cavity and upper aerodigestive tract. The parotid gland is the most common site of origin, accounting for approximately 70–80% of salivary gland neoplasms, the majority of which are benign. In contrast, tumors arising in the sublingual gland and many minor salivary gland sites have a substantially higher likelihood of malignancy. Overall, malignant salivary gland tumors account for less than 1% of all malignancies and approximately 3–5% of head and neck cancers (NCI, 2024).

Salivary gland carcinomas encompass a wide range of histologic subtypes, including mucoepidermoid carcinoma, acinic cell carcinoma, adenocarcinoma, adenoid cystic carcinoma, malignant myoepithelial tumors, and salivary duct carcinoma, among others. Squamous cell carcinoma and lymphoma may occur in the parotid gland, most often representing metastatic or secondary disease rather than primary salivary gland origin. Histologic grade, tumor size, site of origin, and extent of local or regional spread all contribute to prognosis, with clinical stage, particularly tumor size and extranodal extension, being a key determinant of outcome (NCI, 2024).

Although most parotid gland tumors are benign, bilateral parotid masses are most commonly Warthin tumors. Malignant disease should be suspected when imaging or clinical features demonstrate pain, rapid growth, facial nerve dysfunction, fixation to surrounding tissues, or regional lymphadenopathy. Given the rarity and heterogeneity of these tumors, management strategies are guided by multidisciplinary consensus and emphasize individualized treatment planning supported by accurate imaging evaluation (NCCN, 2026).

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Evidence Discussion

Imaging criteria for salivary gland cancers are supported by evidence demonstrating that accurate characterization of tumor extent, perineural involvement, and regional spread is critical for prognosis and treatment selection (NCI, 2024; NCCN, 2026). Clinical evidence indicates that tumor stage is a stronger predictor of outcome than histologic grade alone, reinforcing the importance of thorough imaging-based staging. Detection of extraparenchymal extension, nodal metastases, or distant disease alters management toward more aggressive local therapy or systemic treatment options. Imaging thereby prevents undertreatment of advanced disease and avoids unnecessary surgery in cases where unresectable or metastatic disease is present (NCI, 2024).

Because salivary gland cancers are rare and heterogeneous, most evidence guiding imaging strategies is derived from retrospective studies and expert consensus rather than randomized trials. Nonetheless, consistent data support the central role of high-quality cross-sectional imaging in optimizing outcomes while minimizing morbidity. Adherence to structured imaging criteria ensures appropriate use of advanced imaging, reduces diagnostic uncertainty, and supports multidisciplinary decision-making aligned with evidence-based practice (NCI, 2024; NCCN, 2026).

Health Equity Considerations

Salivary gland cancers are rare and biologically heterogeneous malignancies with documented disparities in incidence, treatment, and survival across racial, sex, and socioeconomic groups. Population-based analyses demonstrate that Black individuals experience worse disease-specific survival than White individuals, even after adjustment for age, tumor stage, histology, and treatment variables, with particularly pronounced disparities observed in mucoepidermoid and squamous cell carcinoma subtypes (Russell et al., 2014). These outcome differences are partly attributable to lower rates of definitive surgical management among Black individuals, suggesting potential delays in diagnosis, incomplete staging, or barriers to timely referral and specialty care that may directly affect the appropriateness and timing of diagnostic imaging (Russell et al., 2014). Given the importance of imaging for local tumor characterization, nodal assessment, and surgical planning, such disparities may contribute to variation in initial disease evaluation and management.

Socioeconomic factors also play a significant role in survival outcomes for individuals with salivary gland malignancies. Higher income levels have been associated with improved overall survival, particularly among male individuals, highlighting the influence of economic resources on access to care and treatment continuity (Cunningham et al., 2026). Individuals from lower socioeconomic backgrounds may face barriers to timely diagnostic imaging, comprehensive assessment of locoregional and nodal disease, and standardized post-treatment surveillance, increasing the risk of delayed intervention or under-monitoring. Given the wide histologic diversity of salivary gland tumors and their

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complex anatomic considerations, consistent application of evidence-based imaging guidelines for diagnosis, staging, and follow-up supports health equity by promoting uniform evaluation frameworks across care settings and facilitating equitable access to appropriate oncologic management regardless of race, sex, or socioeconomic status (Cunningham et al., 2026; Russell et al., 2014).

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Salivary Gland Cancers – Initial Work-up/ Staging (ONC-4.2)

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Criteria

Indication	Medically Necessary Imaging Study
Biopsy-proven salivary gland malignancy	ONE of the following: • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) • CT Neck with contrast (CPT® 70491) • CT Neck without contrast (CPT® 70490)
Skull base invasion in individuals with salivary gland cancers	• MRI Brain without and with contrast (CPT® 70553)
Individuals with salivary gland cancers with: • Adenoid cystic carcinoma • Lymphadenopathy in the neck • Pulmonary signs or symptoms • Abnormal chest x-ray	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)
Inconclusive findings on conventional imaging in individuals with salivary gland cancers	• PET/CT (CPT® 78815)

Background and Supporting Information

Accurate initial staging is essential due to varied patterns of local extension, perineural spread, and distant metastasis across histologic subtypes (NCI, 2024; Broski et al., 2022). Histologic subtype influences growth patterns and routes of dissemination. Adenoid cystic carcinoma is notable for a high propensity for perineural spread and skull base involvement, often extending intracranially along cranial nerves. Other high grade tumors demonstrate increased risk of regional nodal disease and distant metastases, most commonly to the lungs and bones. These biologic characteristics necessitate tailored imaging assessment to accurately define disease extent at diagnosis (Seo et al., 2015; Larson & Wiggins, 2019).

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Evidence Discussion

Imaging strategies for initial work-up and staging of salivary gland cancers are supported by evidence demonstrating that complete anatomic and biologic characterization influences prognosis and management. MRI of the primary site provides superior evaluation of tumor extent, fascial plane invasion, and perineural spread, features that are strongly associated with recurrence risk and treatment planning. CT offers important adjunctive information for cortical bone involvement and surgical planning, and restricting modality selection to one comprehensive neck study minimizes unnecessary radiation exposure (Broski et al., 2022; Gule-Monroe et al., 2023).

Assessment for skull base invasion is critical, particularly in adenoid cystic carcinoma, where intracranial extension along cranial nerves may alter surgical approach or render disease unresectable. MRI of the brain and skull base has demonstrated higher sensitivity than CT for detecting perineural and intracranial spread, ensuring accurate staging and preventing undertreatment of advanced disease (Seo et al., 2015; Yousem et al., 2000).

Selective chest imaging is supported by evidence indicating that distant metastases, although uncommon overall, occur more frequently in higher-grade tumors, with lungs representing the most common site. Limiting chest CT to individuals with lymphadenopathy, pulmonary findings, or tumor subtypes at higher metastatic risk balances early detection of clinically relevant metastases against the harms of routine imaging in low-risk cases (Ma & Liu, 2020; Mimica et al., 2020; NCI, 2024).

FDG-PET/CT is best reserved for cases with inconclusive conventional imaging. While PET can identify metabolically active disease and distant metastases, variable FDG avidity across salivary gland tumor subtypes and overlap with benign entities (e.g., Warthin tumor) limit its routine use. Employing PET selectively reduces false-positive findings and downstream interventions while preserving its value in complex diagnostic scenarios where management would be altered by additional findings (Larson & Wiggins, 2019; Nakajima et al., 2021; Bianchini et al., 2023).

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Salivary Gland Cancers – Restaging/ Recurrence (ONC-4.3)

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Criteria

Indication	Medically Necessary Imaging Study
After complete surgical resection in individuals with salivary gland cancers	One-time imaging to establish baseline within 3-4 months of surgical resection is considered medically necessary using ONE of the following: • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) • CT Neck with contrast (CPT® 70491) • CT Neck without contrast (CPT® 70490)
Individuals with salivary gland cancers with unresected disease receiving systemic therapy (chemotherapy)	Every 2 cycles: • CT Neck with contrast (CPT® 70491) OR MRI Orbits/Face/Neck without and with contrast (CPT® 70543) • CT with contrast or MRI without and with contrast for any other sites of disease
Recurrence or progression suspected based on new or worsening signs or symptoms in individuals with salivary gland cancers	ONE of the following: • CT Neck with contrast (CPT® 70491) • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) In addition, for all individuals: • CT Chest with contrast (CPT® 71260)
Inconclusive findings on conventional imaging in individuals with salivary gland cancers	• PET/CT (CPT® 78815)
All other individuals with salivary gland cancers	• No routine advanced imaging

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Background and Supporting Information

Restaging and evaluation for recurrence in salivary gland cancers are directed at detecting clinically meaningful disease while accounting for variable tumor biology and patterns of failure. Following definitive treatment, most commonly surgical resection with or without adjuvant therapy, establishing a post-treatment baseline is important to distinguish expected postoperative or post-radiation changes from residual or recurrent tumor. The need for subsequent imaging is guided by treatment status, symptoms, and known sites of disease rather than routine fixed surveillance (NCCN, 2026; Gule Monroe et al., 2023).

Patterns of recurrence depend on histologic subtype and stage at diagnosis. Local and regional recurrences predominate after surgery, whereas distant metastases, most frequently to the lungs, are more common at recurrence than at initial presentation, particularly in high grade tumors and adenoid cystic carcinoma. Ongoing risk of late recurrence, especially in tumors with perineural spread, necessitates symptom directed imaging strategies rather than indiscriminate long term surveillance (Mimica et al., 2020; Ma & Liu, 2020).

Evidence Discussion

Evidence supports a one-time post-resection imaging study with CT or MRI to establish a new baseline for future comparison, as postoperative changes may persist and evolve over months. Establishing this reference standard improves diagnostic confidence on subsequent studies and reduces false-positive interpretation of expected postoperative findings. Additional routine imaging beyond this baseline has not demonstrated outcome benefit in asymptomatic individuals without unresected disease (NCCN, 2026; Gule-Monroe et al., 2023).

For individuals with unresected disease undergoing systemic therapy, interval cross-sectional imaging every two cycles is supported to assess response, guide continuation or modification of therapy, and detect early progression. Imaging of other involved sites is included to provide a comprehensive assessment of disease burden. This approach balances timely detection of progression with minimization of unnecessary imaging, as treatment decisions are directly linked to measurable response (Broski et al., 2022; Geiger et al., 2021).

When recurrence or progression is suspected based on new or worsening signs or symptoms, contrast-enhanced CT or MRI of the neck is supported to evaluate the primary site and regional nodes. CT of the chest is indicated concurrently, as the incidence of pulmonary metastases is substantially higher at recurrence than at initial diagnosis; published series report that a majority of metastatic recurrences involve the chest, often in the absence of respiratory symptoms. Use of intravenous contrast improves detection of nodal and mediastinal disease (Mimica et al., 2020; Ma & Liu, 2020).

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FDG-PET/CT is reserved as a problem-solving tool for inconclusive findings on conventional imaging. Limiting PET use in this setting avoids false-positive results related to postoperative or treatment-related inflammation and reduces unnecessary downstream interventions. This selective strategy aligns diagnostic benefit with patient safety and resource stewardship while preserving PET utility when management would change based on additional metabolic information (Nakajima et al., 2021; Larson & Wiggins, 2019).

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Salivary Gland Cancers – Surveillance/ Follow-up (ONC-4.4)

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Criteria

Indication	Medically Necessary Imaging Study
Total surgical resection in individuals with salivary gland cancers	Every 6-12 months for up to 2 years: • CT Neck with contrast (CPT® 70491) AND • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)
Unresectable or partially resected disease in individuals with salivary gland cancers, including those treated with radiation therapy	• Either CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543) once within 6 months of completion of treatment
Adenoid cystic carcinoma	ANY of the following, annually for up to 10 years: • CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)

Background and Supporting Information

Surveillance following treatment for salivary gland cancers is focused on detection of clinically meaningful recurrence while minimizing unnecessary imaging. These tumors demonstrate heterogeneous biologic behavior based on histologic subtype, grade, and extent of disease at diagnosis. For most salivary gland malignancies, the risk of recurrence is highest within the first few years following treatment and is often heralded by patient-reported symptoms or abnormal findings on physical examination rather than routine imaging (NCCN, 2026, NCI, 2024).

Adenoid cystic carcinoma represents a distinct clinical entity within salivary gland cancers due to its indolent but persistent natural history, marked propensity for perineural spread, and high rate of late distant metastasis. Unlike other salivary gland

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malignancies, this subtype is associated with a prolonged risk of recurrence that may extend for a decade or more after initial treatment, necessitating extended imaging surveillance (Mimica et al., 2020; Ma & Liu, 2020).

Evidence Discussion

For individuals who have undergone total surgical resection of salivary gland cancer, evidence supports limited surveillance imaging during the first two years after treatment with imaging of the primary site and chest every 6 to 12 months. ASCO guidelines note that surveillance imaging of the primary site may be obtained every 6 to 12 months during the first two years following treatment, reflecting the period when recurrence risk is greatest. Beyond this period, follow-up is primarily guided by symptoms and physical examination findings rather than routine imaging, as evidence demonstrating improved outcomes from prolonged routine surveillance is limited (Geiger et al., 2021).

For individuals with unresectable or partially resected disease, or those treated with radiation therapy, a single post-treatment imaging study within six months is supported to establish a baseline for future comparison. This approach improves diagnostic confidence when evaluating subsequent clinical changes while avoiding excessive imaging once post-treatment anatomy has stabilized. Further imaging is guided by symptoms or clinical concern for progression rather than fixed surveillance intervals (Gule-Monroe et al., 2023; Broski et al., 2022).

Adenoid cystic carcinoma warrants a different surveillance strategy due to its distinct recurrence pattern. Multiple series demonstrate that this histology accounts for a disproportionate share of late metastatic recurrences, with more than 60% of individuals presenting with distant metastases at the time of recurrence and a median time to recurrence of approximately three years, with some occurring beyond ten years. Annual imaging of the neck and chest for up to ten years is therefore supported to enable detection of late locoregional or pulmonary recurrence that may be amenable to intervention (Mimica et al., 2020; Ma & Liu, 2020; NCI, 2024).

Routine surveillance PET/CT is not supported due to variable sensitivity across salivary gland tumor subtypes and increased likelihood of false-positive findings from postoperative or radiation-related changes. Restricting PET/CT to problem-solving scenarios aligns imaging use with evidence-based benefit and reduces downstream harm while preserving clinical utility in selected cases where management would be altered (Nakajima et al., 2021; Larson & Wiggins, 2019).

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Melanomas and Other Skin Cancers (ONC-5)

Guideline

Melanoma – Suspected/Diagnosis (ONC-5.1)
Melanoma – Initial Work-up/Staging (ONC-5.2)
Melanoma – Restaging/Recurrence (ONC-5.3)
Melanoma – Surveillance/Follow-up (ONC-5.4)
Non-Melanoma Skin Cancers – General Considerations (ONC-5.5)
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Melanoma – Suspected/Diagnosis (ONC-5.1)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with suspected melanoma	• Imaging is not considered medically necessary until histologic diagnosis is confirmed

Background and Supporting Information

Cutaneous melanoma is a malignant neoplasm arising from melanocytes and is diagnosed primarily through clinical examination followed by histopathologic confirmation. Definitive diagnosis requires tissue sampling, most commonly via excisional biopsy of the suspicious lesion with narrow margins. The diagnosis is based on histologic features including Breslow thickness, ulceration status, mitotic rate, and margin involvement, which together determine staging and guide subsequent management (NCCN, 2025).

Evidence Discussion

Evidence supports the exclusion of routine imaging during the suspected or diagnostic phase of melanoma evaluation. Multiple observational studies summarized in the NCCN Guidelines demonstrate that imaging performed prior to histologic confirmation has a very low yield for clinically meaningful findings, particularly in individuals with localized cutaneous lesions. Early melanoma rarely presents with detectable nodal or distant metastases, making imaging both inefficient and unlikely to influence diagnostic decision-making at this stage (NCCN, 2025).

Imaging before biopsy carries measurable risks, including false-positive findings that may lead to unnecessary anxiety, additional testing, invasive procedures, and delays in definitive diagnosis. Cross-sectional imaging and functional studies may also identify incidental findings unrelated to melanoma, further complicating care without providing diagnostic clarity (NCCN, 2025).

Histopathologic evaluation remains the gold standard for diagnosis and provides the critical prognostic variables required for staging and risk assessment. These parameters, particularly Breslow depth and ulceration, are superior predictors of regional and distant spread compared with any imaging modality in the absence of confirmed

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disease. Imaging cannot substitute for tissue diagnosis and does not improve diagnostic accuracy when used prematurely (NCCN, 2025).

Restricting imaging until after histologic confirmation aligns diagnostic practice with evidence-based risk-benefit principles. This approach minimizes unnecessary harm, conserves resources, and ensures that imaging, when eventually performed, is applied in clinically appropriate contexts where it can meaningfully guide staging and management decisions (NCCN, 2025).

Health Equity Considerations

Melanoma outcomes vary substantially by socioeconomic status, health care access, and health system structure, with consistent evidence of inequities in stage at diagnosis and melanoma-specific mortality. Lower socioeconomic status is strongly associated with later stage at presentation and higher risk of melanoma-related death, even among insured populations, reflecting delays in dermatologic evaluation and fragmented access to specialty care (Rosenthal et al., 2023). Individuals from lower socioeconomic backgrounds are more likely to present with thicker or more advanced tumors and experience barriers to coordinated diagnostic pathways, which may affect the timing, appropriateness, and intensity of staging and surveillance imaging (Cortez et al., 2021). In contrast, integrated health care systems demonstrate reduced socioeconomic gradients in stage at diagnosis and melanoma-specific survival, highlighting the role of system-level factors in mitigating disparities (Rosenthal et al., 2023).

Racial and ethnic minority populations, while experiencing lower overall melanoma incidence, are disproportionately diagnosed with advanced-stage disease and higher-risk subtypes, including acral and mucosal melanomas that are more difficult to detect clinically and often identified later in the disease course (Cortez et al., 2021; Shao & Feng, 2022). These disparities are closely linked to reduced access to dermatologic care, lower melanoma awareness, differences in clinical presentation, and insurance-related barriers rather than biological differences alone (Cortez et al., 2021; Shao & Feng, 2022). Delayed detection in these populations may necessitate more extensive imaging at presentation and limit opportunities for earlier-stage management. Consistent, evidence-based application of imaging guidelines for melanoma staging and follow-up supports health equity by promoting uniform assessment and longitudinal monitoring across diverse populations, regardless of race, ethnicity, or socioeconomic status (Rosenthal et al., 2023; Cortez et al., 2021).

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Melanoma – Initial Work-up/Staging (ONC-5.2)

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Criteria

Indication	Medically Necessary Imaging Study
Stage 0 or IA melanoma (in situ or disease less than 1mm)	• Routine advanced imaging is not considered medically necessary
• Stage IB melanoma (less than 0.8mm with ulceration or 0.8-1mm without or with ulceration) • Stage IIA and/or IIB or IIC melanoma with no adjuvant therapy planned (lesions greater than 1mm thick, but node negative)	• CT with contrast or MRI without and with contrast of specific areas, only if signs or symptoms indicate need for further evaluation
For sentinel lymph node evaluation in stages IB and II melanoma	• Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
Any of the following: • Stage IIB and IIC melanoma prior to planned adjuvant therapy • Stage III melanoma (sentinel node positive, palpable regional nodes) • Stage IV melanoma (metastatic)	• MRI Brain without and with contrast (CPT® 70553) AND one of the following: • PET/CT (CPT® 78815 or CPT® 78816) OR • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177)
• Head or neck primary site of melanoma • Palpable lymphadenopathy in the neck in individuals with melanoma • Mucosal melanoma of the head or neck region	In addition to above initial staging imaging, if PET/CT not performed: • CT Neck with contrast (CPT® 70491)

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Indication	Medically Necessary Imaging Study
• Primary site of melanoma is unknown **and** CT Chest, Abdomen, and Pelvis are negative	• PET/CT (CPT® 78815 or CPT® 78816)

Background and Supporting Information

Cutaneous melanoma is staged using clinicopathologic parameters that include Breslow thickness, ulceration, mitotic rate, lymph node involvement, and the presence of distant metastases. Most individuals present with localized disease; population based data indicate that the majority of melanomas are diagnosed at early stages, with a favorable prognosis following surgical excision alone. Accurate pathologic staging is therefore central to determining the need for additional diagnostic evaluation or imaging (NCCN, 2025; Siegel et al., 2025).

Early stage melanoma (stage 0 or IA) carries an excellent prognosis, with very low risk of nodal or distant metastatic disease. Survival rates for localized melanoma exceed 98%, reflecting the effectiveness of surgical management alone. As tumor thickness and adverse histologic features increase, the risk of regional nodal involvement rises, prompting consideration of sentinel lymph node evaluation to refine staging and prognostication (NCCN, 2025; Melanoma Research Alliance).

Evidence Discussion

Evidence supports withholding routine advanced imaging in individuals with stage 0 or IA melanoma because the prevalence of occult metastatic disease is extremely low and imaging has not demonstrated clinical benefit in this population. Studies consistently show a high false-positive rate and low diagnostic yield when imaging is used for screening asymptomatic patients with thin melanomas, exposing individuals to unnecessary radiation and additional procedures without improving outcomes (NCCN, 2025; Schröer-Günther et al., 2012).

For stage IB and II melanoma, sentinel lymph node evaluation is supported as an effective staging tool, while routine cross-sectional imaging is limited to scenarios in which signs or symptoms raise concern for metastatic disease. The likelihood of detecting distant metastases in asymptomatic individuals at these stages remains low, and indiscriminate imaging is associated with false-positive findings and increased healthcare utilization without survival benefit. Imaging in this setting is therefore justified only for targeted clinical indications or surgical planning (NCCN, 2025; Kappelin et al., 2022).

In contrast, individuals with stage III or IV melanoma have a significantly higher burden of metastatic disease, supporting comprehensive staging with PET/CT or CT chest, abdomen, and pelvis, along with baseline MRI of the brain. PET/CT has demonstrated

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superior sensitivity compared with conventional CT for detecting distant metastases, while MRI brain is necessary given the high cumulative risk of CNS involvement, which is reported in up to one-third or more of patients with advanced disease (NCCN, 2025; Schröer-Günther et al., 2012).

When the primary site of melanoma is unknown or when conventional imaging is negative despite clinical suspicion, PET/CT is supported due to its ability to evaluate the entire body, including extremities, with high sensitivity. Restricting advanced imaging to higher-risk stages and defined clinical scenarios balances the benefits of accurate staging against potential harms, including radiation exposure, overdiagnosis, and delays in treatment, and reflects evidence-based imaging stewardship (NCCN, 2025; Siegel et al., 2025).

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Melanoma – Restaging/Recurrence (ONC-5.3)

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Criteria

- All recurrences should be confirmed histologically, except when excessive morbidity from a biopsy may occur, such as a biopsy requiring craniotomy.

Indication	Medically Necessary Imaging Study
Individuals with melanoma receiving chemotherapy, with measurable disease, every 2 cycles (commonly every 6 to 8 weeks)	• CT Chest with contrast (CPT® 71260); **and** CT Abdomen and Pelvis with contrast (CPT® 74177)
All in situ recurrences of melanoma	• Restaging imaging is not considered medically necessary after adequate aggressive local therapy (See Surveillance below)
Documented or clinically suspected (see top of page regarding biopsy morbidity) recurrence of melanoma at: • True scar recurrence (if re-excision suggests more than in situ disease) • In-transit disease • Regional lymph nodes • Metastatic site	• CT Chest with contrast (CPT® 71260); **and** CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Brain without and with contrast (CPT® 70553) In addition, for head or neck primary: • CT Neck with contrast (CPT® 70491)
ANY of the following in individuals with melanoma: • Inconclusive findings on conventional imaging • Isolated metastatic site found on conventional imaging	• PET/CT (CPT® 78815 or CPT® 78816)

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Indication	Medically Necessary Imaging Study
Brain imaging in individuals with melanoma: • New discovery of metastatic disease or progression of metastatic disease • Signs or symptoms of CNS disease • If considering Interleukin (IL-2) therapy	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Melanoma recurrence may occur locally at the primary excision site, in transit along lymphatic channels, within regional lymph nodes, or at distant metastatic sites. The pattern and timing of recurrence are strongly influenced by the initial stage and biologic features of the primary tumor. While early stage melanoma carries a low risk of recurrence, individuals with regional nodal involvement or distant metastases are at substantially increased risk for subsequent disease progression, including central nervous system involvement (NCCN, 2025; Siegel et al., 2025).

Histologic confirmation of recurrence is fundamental to management, as imaging findings alone cannot reliably distinguish melanoma recurrence from benign postoperative or inflammatory processes. Exceptions are limited to scenarios in which biopsy would result in excessive morbidity, such as lesions requiring craniotomy. Accurate confirmation ensures that imaging based restaging is applied to individuals with clinically meaningful disease (NCCN, 2025).

Evidence Discussion

Evidence supports the use of interval CT chest, abdomen, and pelvis for individuals receiving systemic therapy for recurrent or metastatic melanoma with measurable disease, typically performed every two treatment cycles. This approach allows timely assessment of therapeutic response or progression while avoiding excessive imaging frequency. CT provides reliable evaluation of visceral and nodal disease, which are common sites of melanoma recurrence (NCCN, 2025; Schröer-Günther et al., 2012).

In contrast, in situ recurrences have an excellent prognosis following adequate local therapy and do not warrant restaging imaging. Published data demonstrate a very low likelihood of systemic spread in this setting, and routine imaging would expose individuals to unnecessary radiation and false-positive findings without clinical benefit (NCCN, 2025; Melanoma Research Alliance).

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For documented or clinically suspected recurrence involving the primary site, in-transit disease, regional lymph nodes, or distant metastases, comprehensive restaging with CT Chest/Abdomen/Pelvis and MRI Brain is supported. Melanoma has one of the highest rates of CNS metastases among solid tumors, and brain involvement may be present even in the absence of neurologic symptoms. MRI provides superior sensitivity for detecting intracranial disease and is therefore considered medically necessary in these contexts (NCCN, 2025; Schröer-Günther et al., 2012).

PET/CT is reserved for problem-solving scenarios, such as inconclusive conventional imaging or evaluation of a solitary metastatic focus. Limiting PET use reflects evidence showing that indiscriminate PET imaging increases false-positive findings and downstream interventions without improving outcomes. MRI brain is additionally required for new or progressive metastatic disease, neurologic signs or symptoms, or when considering interleukin-2 therapy, given the treatment-related risks associated with occult CNS metastases (NCCN, 2025).

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Melanoma – Surveillance/Follow-up (ONC-5.4)

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Criteria

Indication	Medically Necessary Imaging Study
Stage 0, IA, IB and IIA melanomas	• No routine advanced imaging
Stage IIB, IIC, IIIA and IIIB melanomas	• CT Chest (CPT® 71260) **and** CT Abdomen and Pelvis (CPT® 74177) with contrast every 6 months for 2 years, then annually for 3 years • For melanoma arising from extremities, advanced imaging of the primary site is not routinely considered medically necessary for surveillance in asymptomatic individuals.
Stage IIIC and IV melanomas	• CT Chest (CPT® 71260) **and** CT Abdomen and Pelvis (CPT® 74177) with contrast every 3 months for 2 years, then every 6 months for 3 years • MRI Brain without and with contrast (CPT® 70553) annually for 3 years • For melanoma arising from extremities, advanced imaging of the primary site is not routinely considered medically necessary for surveillance in asymptomatic individuals.
Mucosal melanoma of the head or neck region	In addition to above stage-based surveillance imaging, ONCE within 6 months of completing all treatment: • CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543) • CT with contrast of any other involved body area
Liver metastases treated with focal therapy	• See: **Liver Metastases (ONC-31.2)**

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Indication	Medically Necessary Imaging Study
Vulvar or vulvovaginal melanoma stage 0, IA, IB and IIA	Ultrasound of the Abdomen (CPT® 76700 or 76705) and/or Pelvis (CPT® 76856 or 76857)
Vulvar or vulvovaginal melanoma stage IIB or higher	CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) every 3 months for 2 years, and then every 6 months for 3 years

Background and Supporting Information

Surveillance strategies in melanoma are driven by the strong relationship between disease stage and risk of recurrence. Most individuals with early stage melanoma remain disease free following definitive local therapy, whereas those with more advanced stages face a significantly higher likelihood of locoregional or distant recurrence, often within the first several years after treatment. Follow up approaches are therefore deliberately risk stratified to balance early detection of clinically meaningful recurrence against the harms of unnecessary imaging (NCCN, 2025; Garbe et al., 2003).

Evidence Discussion

Evidence consistently shows that routine advanced imaging does not improve outcomes for individuals with stage 0, IA, IB, or IIA melanoma. In these groups, the majority of recurrences are identified clinically, and imaging surveillance yields a very low rate of actionable findings. Studies demonstrate substantial false-positive rates, increased anxiety, added costs, and exposure to cumulative radiation without a corresponding survival benefit, supporting omission of routine imaging in early-stage disease (Garbe et al., 2003; NCCN, 2025).

As melanoma stage increases, both the likelihood and tempo of recurrence rise, justifying structured imaging surveillance in stage IIB through IIIB disease. Data indicate that recurrence risk declines markedly after approximately 2–3 years, supporting more frequent CT chest/abdomen/pelvis imaging early in surveillance followed by longer intervals thereafter. CT is favored over PET/CT in this setting due to adequate sensitivity for visceral disease and a lower rate of false-positive findings (Garbe et al., 2003; NCCN, 2025).

Stage IIIC and IV melanoma are associated with a particularly high risk of early systemic and intracranial recurrence. Regular CT surveillance is supported to detect rapidly progressive metastatic disease, while annual MRI of the brain is necessary given the substantial incidence of brain metastases in advanced melanoma. CNS involvement has significant prognostic and therapeutic implications, particularly in the era of immune checkpoint inhibitors and targeted therapies (NCCN, 2025; van Opijnen et al., 2019).

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The limited utility of routine PET/CT in surveillance, particularly in sentinel node–positive stage III melanoma, supports the preferential use of CT-based imaging strategies. Evidence shows a low proportion of true-positive PET findings and a higher incidence of false-positive results that may prompt unnecessary interventions. Surveillance strategies that align imaging intensity with recurrence risk optimize early detection where beneficial while minimizing harm in lower-risk populations (Garbe et al., 2003; NCCN, 2025).

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Non-Melanoma Skin Cancers – General Considerations (ONC-5.5)

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Criteria

- Advanced imaging is generally not considered medically necessary for basal cell and squamous cell skin cancers.
- PET/CT scan is not considered medically necessary for evaluation of non-melanoma skin cancers unless specified within the guidelines below (e.g., Merkel cell carcinoma).

Background and Supporting Information

Non-melanoma skin cancers (NMSCs) primarily include basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC), which together represent the most common malignancies diagnosed worldwide. These tumors arise from keratinocytes and most frequently occur on chronically sun-exposed skin. The vast majority of BCCs and cSCCs demonstrate indolent local behavior and are effectively managed with local therapies such as surgical excision or Mohs micrographic surgery, without need for systemic staging or imaging (Shreve et al., 2020).

Basal cell carcinoma is characterized by slow growth and a very low risk of metastasis, typically confined to locally destructive behavior if untreated. Cutaneous squamous cell carcinoma carries a slightly higher risk of regional nodal spread and distant metastasis than BCC, particularly in the presence of high risk features such as large tumor size, deep invasion, poor differentiation, perineural invasion, immunosuppression, or high risk anatomic sites (e.g., ear, lip) (Shreve et al., 2020). Even in these cases, systemic dissemination remains uncommon.

Merkel cell carcinoma (MCC) is biologically distinct from other NMSCs. It is a rare, aggressive neuroendocrine carcinoma of the skin with a marked propensity for early regional lymph node involvement and distant metastatic spread, including visceral and pulmonary metastases. MCC may arise as a primary cutaneous malignancy or represent cutaneous involvement by a non cutaneous neuroendocrine carcinoma, such as small cell lung cancer, necessitating a different diagnostic and imaging approach (NCCN, 2026).

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Evidence Discussion

Clinical evidence strongly supports the position that routine advanced imaging, including PET/CT, is not supported for basal cell carcinoma or most cutaneous squamous cell carcinomas. Long-term observational studies demonstrate that metastatic BCC is exceedingly rare, with reported rates well under 1% even after extended follow-up, and that most lesions are successfully treated with local therapy alone (Shreve et al., 2020). Imaging in these cases provides little diagnostic yield and introduces unnecessary radiation exposure and potential false-positive findings.

Metastatic cSCC is also uncommon, particularly in low-risk tumors, with most cases of spread occurring in tumors with clearly defined high-risk clinicopathologic features. Even in high-risk cSCC, regional lymph node involvement is more frequent than distant metastasis, and imaging is best reserved for selected cases guided by clinical concern rather than applied routinely. This selective approach minimizes overuse of imaging while maintaining sensitivity for clinically meaningful disease (Shreve et al., 2020).

In contrast, Merkel cell carcinoma demonstrates substantially different behavior, with published data indicating regional lymph node involvement in approximately 25%–33% of patients at presentation and a significant risk of distant metastatic spread. Multiple studies summarized in the NCCN Guidelines show that imaging frequently leads to disease upstaging and changes in management, supporting a lower threshold for advanced imaging in MCC compared with other NMSCs (NCCN, 2026).

Distinguishing primary MCC from cutaneous metastasis of a non-cutaneous neuroendocrine carcinoma has important prognostic and therapeutic implications. Imaging is therefore essential in suspected MCC to evaluate nodal basins and distant organs, particularly the lungs, where metastatic disease may originate or preferentially spread. Restricting intensive imaging strategies to MCC while avoiding routine use in BCC and cSCC aligns diagnostic benefit with tumor biology and avoids unnecessary harm from low-yield imaging in indolent disease (NCCN, 2026).

Health Equity Considerations

Non-melanoma skin cancers (NMSCs) demonstrate important disparities in disease severity, presentation, and outcomes across racial, ethnic, and socioeconomic groups. Although NMSCs are less common in individuals of color, Hispanic/Latino patients have been shown to present with significantly larger tumor burdens at the time of definitive treatment, as reflected by larger Mohs micrographic surgery defect sizes, suggesting later diagnosis and more advanced disease at presentation (Blumenthal et al., 2022). These disparities are further influenced by insurance type, with publicly insured and HMO-insured individuals demonstrating larger defect sizes compared with those with private insurance, highlighting the role of access to timely dermatologic evaluation and treatment (Blumenthal et al., 2022).

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Individuals of racial and ethnic minority groups are also more likely to develop NMSCs in anatomically or clinically less conspicuous locations and may experience delays due to lower skin cancer risk awareness, limited access to dermatologists, and reduced exposure to preventive education (Shao & Feng, 2022). Such delays can result in more locally advanced disease requiring more extensive surgical management and, in select cases, advanced imaging for assessment of perineural invasion, regional spread, or high-risk features. Consistent application of guideline-based imaging for high-risk NMSC is important to support equitable staging, treatment planning, and follow-up across diverse populations.

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Non-Melanoma Skin Cancers – Initial Work-up/Staging (ONC-5.6)

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Criteria

Indication	Medically Necessary Imaging Study
Body area with unexplained signs or symptoms in individuals with non-melanoma skin cancers	• CT with contrast of that body area
Perineural invasion or local regional extension (i.e., bone; deep soft tissue) involvement in individuals with non-melanoma skin cancers	ONE of the following of the primary site: • MRI without contrast **or** without and with contrast • CT (contrast as requested)
Skin lesion may be a dermal metastasis from distant primary in individuals with non-melanoma skin cancers	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • PET/CT (CPT® 78815 or CPT® 78816) if conventional imaging (CT or MRI) is unable to identify a primary site
Squamous cell carcinoma head or neck skin with regional lymphadenopathy	• CT Neck (CPT® 70491) and CT Chest (CPT® 71260) with contrast
Merkel Cell carcinoma	• Lymph system imaging (lymphoscintigraphy, CPT® 78195) for sentinel lymph node evaluation ◦ SPECT/CT (CPT® 78830) if requested) • PET/CT (CPT® 78815 or CPT® 78816) OR CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of other involved body area(s)

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Indication	Medically Necessary Imaging Study
Signs or symptoms of CNS involvement in individuals with non-melanoma skin cancers	• MRI Brain with and without contrast (CPT® 70553)

Background and Supporting Information

Non-melanoma skin cancers (NMSC) include basal cell carcinoma (BCC), cutaneous squamous cell carcinoma (cSCC), and rare aggressive entities such as Merkel cell carcinoma (MCC). BCC and cSCC arise from keratinocytes and are predominantly diagnosed at an early stage through clinical examination and biopsy. Most cases are localized and adequately characterized by physical examination and histopathology, with imaging reserved for situations where clinical assessment is insufficient to determine disease extent (NCCN, 2026).

Evidence Discussion

Available evidence supports a targeted imaging approach for initial work-up and staging of non-melanoma skin cancers based on clinical risk. For most BCC and low-risk cSCC, imaging is not routinely supported because disease is localized and adequately staged through clinical examination and biopsy alone. Imaging is reserved for body areas with unexplained symptoms or when physical examination cannot reliably assess the extent of disease, avoiding unnecessary radiation exposure and low-yield testing (NCCN, 2026).

When perineural invasion or deep local extension is suspected, imaging provides critical anatomic information that directly affects treatment planning. MRI has demonstrated superior sensitivity for detecting perineural tumor spread and deep soft-tissue involvement, while CT is more effective for identifying cortical bone invasion. Selecting modality based on suspected pattern of spread optimizes diagnostic accuracy and minimizes redundant imaging (NCCN, 2026).

In cases where a skin lesion is suspected to represent a dermal metastasis from a distant primary tumor, CT of the chest, abdomen, and pelvis is supported to identify the source malignancy. PET/CT is reserved for situations in which conventional imaging fails to identify a primary site, particularly when disease distribution suggests an origin outside the imaged field (NCCN, 2026).

Merkel cell carcinoma warrants comprehensive imaging at diagnosis due to its aggressive natural history. Evidence summarized in NCCN guidelines demonstrates that FDG-PET/CT frequently detects clinically occult nodal or distant disease and results in disease upstaging that alters management. Sentinel lymph node mapping is also supported for accurate regional staging. This imaging-intensive approach for MCC

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contrasts with the conservative imaging strategy appropriate for BCC and most cSCC, aligning diagnostic intensity with tumor biology and risk (NCCN, 2026).

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Non-Melanoma Skin Cancers – Restaging/Recurrence (ONC-5.7)

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Criteria

- All recurrences should be confirmed histologically, except when excessive morbidity from a biopsy may occur, such as a biopsy requiring craniotomy.

Indication	Medically Necessary Imaging Study
Recurrence of non-melanoma skin cancer where planned therapy is more extensive than simple wide local excision	• CT with contrast of the primary and recurrent site(s)
Suspected recurrence of Merkel cell carcinoma	• CT Chest (CPT® 71260) **and** CT Abdomen and Pelvis (CPT® 74177) with contrast • CT with contrast of other symptomatic body area(s)
For the following (for Merkel cell carcinoma): • Inconclusive findings on conventional imaging • If no conventional imaging has been performed, and ONE of the following: ◦ Biopsy-proven recurrence ◦ Suspected in-transit metastatic disease from a primary site in the extremities	• PET/CT (CPT® 78815 or 78816)

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Indication	Medically Necessary Imaging Study
Signs or symptoms of CNS involvement in individuals with non-melanoma skin cancers	• MRI Brain without and with contrast (CPT® 70553)
Treatment response in individuals with Merkel cell carcinoma	Every 2 cycles: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • CT with contrast of other symptomatic body area(s)

Background and Supporting Information

Restaging and evaluation for recurrence in non-melanoma skin cancers (NMSC) are guided by tumor biology, histology, and anticipated treatment complexity. Basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC) most often recur locally and remain amenable to surgical management, whereas Merkel cell carcinoma (MCC) demonstrates a substantially higher risk of regional and distant metastatic recurrence. Accurate confirmation of recurrence is essential before advanced imaging is pursued, as benign postoperative or inflammatory changes can mimic recurrent disease on imaging alone (NCCN, 2026).

Histologic confirmation of recurrence is considered standard whenever feasible. Exceptions are limited to circumstances in which biopsy would impose excessive morbidity, such as intracranial disease requiring craniotomy. Establishing recurrent disease prior to imaging ensures that diagnostic studies are applied appropriately to cases where findings will directly influence management decisions (NCCN, 2026).

Evidence Discussion

Evidence supports the use of targeted CT imaging for recurrent non-melanoma skin cancers when treatment planning extends beyond localized excision. For BCC and cSCC, most recurrences are superficial or confined locally, and imaging is not routinely required unless deeper invasion or regional extension is suspected. When more extensive therapy is contemplated, CT with contrast of the primary and recurrent sites provides essential anatomic detail and avoids unnecessary imaging in cases manageable with local surgery alone (NCCN, 2026).

Merkel cell carcinoma recurrence carries a high probability of regional and distant metastatic disease, with recurrence frequently involving the chest, abdomen, pelvis, or other symptomatic sites. NCCN guidance supports CT Chest/Abdomen/Pelvis with contrast for suspected MCC recurrence, as this approach reliably identifies common

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metastatic sites and informs decisions regarding systemic therapy versus localized intervention (NCCN, 2026).

PET/CT is reserved for specific clinical scenarios in MCC, including inconclusive findings on conventional imaging or evaluation of suspected in-transit metastases from primary tumors arising on the extremities. In these settings, PET/CT improves detection of metabolically active disease and delineates disease burden more accurately than anatomic imaging alone, thereby influencing staging and management. Limiting PET/CT to these contexts mitigates false-positive findings and unnecessary downstream interventions (NCCN, 2026).

MRI of the brain is supported only when signs or symptoms suggest central nervous system involvement. CNS metastases are uncommon in BCC and cSCC but may occur in advanced MCC. Symptom-directed brain imaging ensures timely detection of clinically significant disease while avoiding routine CNS imaging in asymptomatic individuals, aligning imaging intensity with demonstrated clinical risk (NCCN, 2026).

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Non-Melanoma Skin Cancers – Surveillance/Follow-up (ONC-5.8)

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Criteria

Indication	Medically Necessary Imaging Study
Merkel cell cancer with any of the following high-risk factors: • Stage II-IV • Individuals assigned male at birth • Immunosuppression • Merkel Cell polyomavirus negative status • Age 70 or higher • Non-sentinel lymph node metastases	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast every 6 months for 5 years • Add CT Neck with contrast (CPT® 70491) if known prior neck disease or scalp/facial/neck disease
All other individuals with non-melanoma skin cancers	• Routine advanced imaging for surveillance is not considered medically necessary • Imaging only for signs and symptoms of recurrent disease

Background and Supporting Information

Surveillance strategies for non-melanoma skin cancers (NMSC) are determined by tumor biology and recurrence risk. Basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC) typically demonstrate indolent behavior, with recurrences most often detected at the primary site through patient self report or physical examination. As a result, ongoing follow up for these cancers emphasizes clinical evaluation rather than routine imaging (NCCN, 2026).

Merkel cell carcinoma (MCC) represents a biologically distinct form of NMSC with aggressive clinical behavior and a high propensity for recurrence. Factors such as advanced stage, older age, immunosuppression, and male sex are associated with substantially increased recurrence risk. Patterns of recurrence in MCC often

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involve lymph nodes, lungs, liver, and other visceral organs, while central nervous system involvement is less common but clinically significant when present. Unlike BCC and cSCC, MCC frequently relapses with regional nodal or distant metastatic disease, prompting greater reliance on imaging during surveillance in selected high risk individuals (NCCN, 2026).

Evidence Discussion

Evidence supports the exclusion of routine advanced imaging for surveillance of BCC and cSCC in the absence of signs or symptoms of recurrence. Most relapses are detected clinically, and imaging has a low diagnostic yield in asymptomatic individuals. Data summarized in oncology surveillance literature demonstrate that routine imaging in low-risk cutaneous malignancies increases false-positive findings, healthcare utilization, and patient anxiety without improving survival or recurrence outcomes (NCCN, 2026; Rajagopal et al., 2024).

In contrast, MCC demonstrates substantially higher recurrence rates, particularly in node-positive and advanced-stage disease, with reported recurrence approaching one-third of patients within five years. Risk is further increased among individuals assigned male at birth, those aged 70 years or older, immunosuppressed individuals, and patients with polyomavirus-negative tumors or non-sentinel lymph node metastases. These data support structured imaging surveillance in high-risk MCC populations (NCCN, 2026c).

CT imaging of the chest, abdomen, and pelvis at defined intervals allows for detection of clinically occult metastases in common sites of MCC spread and may enable earlier initiation of systemic therapy. Additional CT imaging of the neck is justified when prior disease involved cervical lymph nodes or when primary tumors arise from the scalp, face, or neck. This targeted imaging strategy aligns surveillance intensity with biologic risk while avoiding unnecessary whole-body imaging in lower-risk individuals (NCCN, 2026).

Findings from broader cutaneous oncology surveillance studies reinforce this selective approach. Rajagopal et al. demonstrated that surveillance imaging provides limited benefit in low-risk skin cancer populations but may detect actionable recurrences in higher-risk groups. Applying imaging only to MCC patients with established high-risk features balances potential benefits of early detection against harms associated with over-imaging, including radiation exposure and false-positive results (Rajagopal et al., 2024).

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Ocular Melanoma (ONC-5.9)

ON.SC.0005.9.A
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Criteria

- Biopsy is usually not medically necessary for initial diagnosis of uveal melanoma but may be useful in cases when diagnosis is uncertain (e.g., amelanotic tumors, retinal detachment) or for prognostic analysis and risk stratification.
- Surveillance of the affected eye is with clinical examination only; advanced imaging is considered medically necessary for surveillance of systemic metastatic disease based on individual risk factors. See risk categories below for surveillance recommendations.

Ocular Melanoma Risk Categories

Low Risk	Medium Risk	High-Risk
T1	T2 and T3	T4
Class IA	Class IB	Class 2
Spindle cell histology	Mixed Spindle and Epitheloid cells	Epitheloid cell histology
No extraoccular extension	No extraoccular extension	Extraoccular extension present
No ciliary body involvement	No ciliary body involvement	Ciliary body involvement present
Chromosome mutations: • Disomy 3 • EIF1AX mutation • Gain of chromosome 6p	Chromosome mutations: • SF3B1 mutation	Chromosome mutations: • BAP1 mutation • PRAME mutation • Monosomy 3 • Gain of chromosome 8q

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Indication	Medically Necessary Imaging Study
Initial staging of suspected or biopsy-proven uveal melanoma	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177), OR MRI Abdomen without and with contrast (CPT® 74183) with CT Pelvis with contrast (CPT® 72193), OR MRI Abdomen without and with contrast (CPT® 74183) with MRI Pelvis without and with contrast (CPT® 72197) • MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
Neurological signs/ symptoms in individuals with ocular melanoma	• MRI Brain without and with contrast (CPT® 70553)
Restaging/suspected recurrence of ocular melanoma	ANY or ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260) • PET/CT (CPT® 78815 or 78816) AND one of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) OR • MRI Abdomen without and with contrast (CPT® 74183) with CT Pelvis with contrast (CPT® 72193) OR ◦ Ultrasound Abdomen substituted for MRI Abdomen if requested • MRI Abdomen without and with contrast (CPT® 74183) with MRI Pelvis without and with contrast (CPT® 72197)
Surveillance for Low Risk ocular melanoma	Annually for 10 years: • CT Chest with contrast (CPT® 71260) • CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)

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Indication	Medically Necessary Imaging Study
Surveillance for Medium Risk ocular melanoma	Every 6 months up to year 10: • CT Chest with contrast (CPT® 71260) • CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)
Surveillance for High-risk ocular melanoma	Every 3 months for 5 years, then every 6 months up to year 10: • CT Chest with contrast (CPT® 71260) • CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)

Background and Supporting Information

Ocular melanoma is a rare malignancy, with approximately 95% arising from the uveal tract (choroid, ciliary body, and iris) and the remaining cases originating from the conjunctiva or orbit. Uveal melanoma represents the most common primary intraocular malignancy in adults but remains uncommon overall, with an incidence of approximately 5 cases per million annually in the United States. Most tumors are localized at diagnosis, and fewer than 3% of individuals present with detectable metastatic disease at initial evaluation (NCCN, 2025; Dennis et al., 2023).

Diagnosis of uveal melanoma is primarily clinical, based on comprehensive ophthalmologic examination and ocular imaging. Biopsy is not routinely required for diagnosis but may be appropriate when the diagnosis is uncertain or when molecular and cytogenetic testing is needed for prognostic stratification. Such testing has become increasingly important to estimate metastatic risk and guide systemic surveillance strategies (NCCN, 2025).

Treatment is directed at the affected eye using local modalities such as plaque brachytherapy, particle beam radiotherapy, stereotactic radiosurgery, or enucleation, depending on tumor size, location, and presence of extraocular extension. Systemic therapy is reserved for individuals with metastatic disease, as local treatment does not prevent the development of distant metastases that arise from early micrometastatic spread (NCCN, 2025; Dennis et al., 2023).

The liver is the predominant site of metastatic spread, involved in approximately 80%-90% of cases with distant disease. Other sites include the lungs, bone, skin/soft tissue, lymph nodes, and less commonly the brain. Surveillance of the treated eye is performed through clinical ophthalmologic examination, while advanced imaging is directed toward detection of systemic metastatic disease and is guided by individual risk stratification (NCCN, 2025).

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Evidence Discussion

Evidence supports focused imaging strategies in ocular melanoma that reflect the unique biologic behavior of the disease. Although the prevalence of metastatic disease at diagnosis is low, the lifetime risk of metastasis is substantial and strongly correlated with tumor stage, histology, and molecular characteristics. Reported five-year metastatic risk ranges from approximately 3%–5% in stage I disease to more than 40% in stage III disease, justifying baseline systemic staging despite low initial yield (NCCN, 2025; Dennis et al., 2023).

MRI of the orbits, face, and neck is supported at initial staging to evaluate extraocular extension, an important determinant of prognosis and local treatment planning. Identification of orbital involvement may alter management by favoring enucleation over radiation-based approaches. CNS imaging is not routinely required but is supported when neurologic signs or symptoms are present, as brain metastases, while uncommon, have significant clinical implications (NCCN, 2025).

Systemic imaging focuses on detection of liver metastases, given the overwhelming hepatic tropism of uveal melanoma. CT or MRI of the abdomen provides sensitive evaluation of hepatic disease, while CT of the chest addresses pulmonary involvement, the second most common metastatic site. Although surveillance imaging carries a low yield in early years for low-risk disease, long-term studies show cumulative metastatic rates may approach 70% over decades, supporting prolonged risk-based surveillance strategies (NCCN, 2025).

Surveillance intensity is therefore stratified by clinical stage, histologic features, and molecular risk markers such as gene expression profile class, chromosomal abnormalities (e.g., monosomy 3, gain of chromosome 8q), and specific mutations including BAP1, SF3B1, and EIF1AX. This approach balances the potential benefits of early detection of treatable metastatic disease against the harms of cumulative radiation exposure, false-positive findings, and low diagnostic yield in low-risk populations, an issue explicitly acknowledged by the NCCN as an area of ongoing debate (NCCN, 2025; Dennis et al., 2023; van Ryan et al., 2025).

Health Equity Considerations

Ocular melanoma, including uveal and conjunctival subtypes, demonstrates measurable disparities in stage at presentation, treatment patterns, and survival associated with socioeconomic status, insurance coverage, and broader social vulnerability. Large national database studies show that uninsured and Medicaid-insured individuals, as well as those in lower income quartiles, are significantly more likely to present with advanced tumor stage at diagnosis, increasing the need for definitive surgical management such as enucleation and limiting opportunities for globe-sparing therapy (Choudhry et al., 2024; Gomez et al., 2024). Higher composite social vulnerability, particularly related to socioeconomic status and housing-transportation barriers, is associated with shorter

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survival and lower likelihood of receiving definitive surgical treatment, independent of tumor site (Mensah et al., 2024).

Racial and ethnic minority status and geographic barriers further contribute to inequities in ocular melanoma care. Systematic reviews and registry-based analyses demonstrate that non-White individuals and those with limited access to specialized ocular oncology centers experience higher rates of enucleation and less favorable outcomes, even when overall survival differences are inconsistent across studies (Shaughnessy et al., 2026; Gomez et al., 2024). Delays in diagnosis and referral may increase reliance on advanced imaging at presentation for tumor characterization, staging, and treatment planning. Consistent, guideline-based imaging, particularly in individuals with limited access to subspecialty care, is important to support equitable staging, appropriate management selection, and surveillance across diverse populations.

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Thyroid Cancer (ONC-6)

Guideline

Thyroid Cancer – General Considerations (ONC-6.0)
Thyroid Cancer – Suspected/Diagnosis (ONC-6.1)
Thyroid Cancer – Initial Work-up/Staging (ONC-6.2)
Thyroid Cancer – Restaging/Recurrence (ONC-6.3)
Thyroid Cancer – Surveillance/Follow-up (ONC-6.4)
References (ONC-6)

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Thyroid Cancer – General Considerations (ONC-6.0)

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Criteria

- Individuals of all ages with thyroid cancer are imaged according to this guideline.
- Whole-Body Thyroid Nuclear scan (also known as whole-body radioiodine scan) is coded with CPT® 78018. If CPT® 78018 is obtained and found to be positive, CPT® 78020 is considered medically necessary as an add-on test to evaluate the degree of iodine uptake.
- Single photon emission computed tomography (SPECT) imaging – Radiopharmaceutical Localization of Tumor SPECT (CPT® 78803 or CPT® 78831) or SPECT/CT Hybrid study (CPT® 78830 or CPT® 78832) may complement planar and pinhole imaging and is considered medically necessary as an add-on wherever radioiodine (RAI) scans are considered medically necessary.
- Whole-Body Thyroid Nuclear scan (also known as whole-body RAI scan) is the imaging modality of choice for differentiated thyroid cancers, as these are usually not well visualized on FDG-PET/CT scans. Individuals who have RAI-diagnostic scan negative and PET-positive disease will generally not respond to RAI treatment, whereas individuals who have PET-negative and RAI-diagnostic scan negative disease may still be candidates for empiric RAI treatment.

Background and Supporting Information

Thyroid carcinoma represents a heterogeneous group of malignancies arising from thyroid follicular or parafollicular cells and includes differentiated carcinomas (papillary, follicular, and oncocytic), medullary carcinoma, and anaplastic carcinoma. Differentiated thyroid cancers comprise the majority of cases and generally demonstrate favorable long term outcomes, with 10 year survival rates exceeding 90%–95% (NCCN, 2025).

Diagnosis is typically initiated by evaluation of a thyroid nodule, most commonly using ultrasound and fine needle aspiration (FNA) cytology, which remains the standard diagnostic approach. Molecular testing may further refine risk assessment and guide management in indeterminate cases. Although many thyroid nodules are benign, malignant nodules may present with suspicious clinical or imaging features such as rapid growth, local invasion, or regional lymphadenopathy. Long term management includes risk adapted surveillance using clinical evaluation, laboratory markers such as thyroglobulin, and selective imaging (NCCN, 2025).

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Evidence Discussion

Evidence supports the use of radioiodine (RAI) whole body scanning as a primary imaging modality in differentiated thyroid cancers due to its high sensitivity for iodine avid disease. RAI imaging allows detection of residual thyroid tissue and metastatic disease and serves as a companion to therapeutic RAI administration. Its diagnostic utility directly informs treatment planning and post therapy assessment, particularly in patients with known or suspected metastatic disease (NCCN, 2025).

The distinction between RAI avid and RAI refractory disease underpins imaging selection and therapeutic decision making. RAI refractory disease is defined by lack of uptake, loss of uptake over time, heterogeneous uptake patterns, or disease progression despite RAI uptake. Recognition of these patterns avoids ineffective repeat RAI therapy and reduces unnecessary radiation exposure, while guiding clinicians toward more appropriate systemic or targeted therapies (NCCN, 2025).

The complementary role of SPECT or SPECT/CT imaging enhances anatomic localization of radioiodine uptake, improving diagnostic accuracy without substantially increasing radiation burden when used as an adjunct. This combined functional anatomic approach provides added value in cases where planar imaging alone is insufficient to characterize disease distribution, especially in complex cervical or mediastinal anatomy (NCCN, 2025).

FDG PET/CT has a limited but clinically important role in thyroid cancer imaging. Evidence demonstrates that PET/CT is less sensitive for iodine avid differentiated thyroid cancers but may identify metabolically active disease in cases where RAI scans are negative. This is particularly relevant in RAI refractory disease, where PET positivity is associated with lack of response to further RAI therapy and may prompt consideration of alternative systemic treatments (NCCN, 2025). This risk adapted imaging strategy balances diagnostic benefit with potential harms, including cumulative radiation exposure and low yield imaging in indolent disease.

Health Equity Considerations

Racial, socioeconomic, and structural inequities influence diagnostic pathways and outcomes for individuals with thyroid cancer. Population-based analyses demonstrate that Black and Hispanic/Latino individuals are less likely to receive guideline-concordant surgical management and experience higher all-cause and thyroid cancer–specific mortality compared with non-Hispanic White individuals, with socioeconomic status accounting for a substantial proportion of these differences (Fwelo et al., 2025; Onadeko & Desai, 2025). Lower income, limited educational attainment, and lack of insurance are associated with more advanced disease at presentation and delays in definitive treatment, factors that may affect the timing and utilization of diagnostic imaging for staging and follow-up (Collins et al., 2024; Chen et al., 2023).

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Access-related barriers further contribute to variability in imaging and care delivery. Individuals from historically marginalized populations are more likely to experience delays in referral to specialty care, receive care from lower-volume providers, and encounter communication or health-literacy challenges that may affect adherence to recommended diagnostic and surveillance pathways (Asamoah et al., 2022; Chen et al., 2023). Cumulative exposure to adverse social determinants of health has been shown to prolong time to treatment initiation, with disproportionate effects observed among Black and Hispanic/Latino individuals, potentially increasing the likelihood of advanced diagnostic evaluation rather than earlier risk-appropriate imaging (Collins et al., 2024; Onadeko & Desai, 2025). Awareness of these factors underscores the importance of consistent, guideline-aligned imaging criteria to support equitable diagnostic evaluation across populations.

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Thyroid Cancer – Suspected/Diagnosis (ONC-6.1)

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- See: **Thyroid Nodule (NECK-8.1)** in the Neck Imaging Guidelines for suspected thyroid malignancies.

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Thyroid Cancer – Initial Work-up/Staging (ONC-6.2)

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Criteria

Follicular, Papillary, and Hürthle Cell (Oncocytic) Carcinomas	Medically Necessary Imaging Study
ONE of the following in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas: • Locally advanced disease or fixation suggested by clinical exam and/or ultrasound • Substernal or bulky disease • Disease precluding full ultrasound examination • Vocal cord paresis • Surgical planning	ONE of the following: • MRI Neck without contrast (CPT® 70540) OR • MRI Neck without and with contrast (CPT® 70543) AND • CT Neck with contrast (CPT® 70491) if contrast study is necessary for complete pre-operative assessment and use of IV contrast will not delay post-operative use of RAI therapy
In individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas: • Extent of thyroid remnant cannot be accurately ascertained from the surgical report, neck ultrasound, or cross-sectional imaging • Unresectable residual disease • To assess for iodine-avid metastatic disease • When the results may alter the decision to treat • Prior to and within 2 weeks (ideally 7 to 10 days) following the administration of RAI therapy	• Whole-Body Thyroid Nuclear scan (CPT® 78018) ◦ CPT® 78020 as an add-on test to evaluate the degree of iodine uptake AND/OR • SPECT (CPT® 78803, or CPT® 78831), OR SPECT/CT Hybrid study (CPT® 78830, or CPT® 78832)

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Follicular, Papillary, and Hürthle Cell (Oncocytic) Carcinomas	Medically Necessary Imaging Study
Skeletal pain in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas	• Bone scan (CPT® 78306) See also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes • Whole-Body Thyroid Nuclear scan (CPT® 78018) ◦ CPT® 78020 as an add-on test to evaluate the degree of iodine uptake AND/OR • SPECT (CPT® 78803 or CPT® 78831), OR SPECT/CT Hybrid study (CPT® 78830, or CPT® 78832)
Suspicious findings on chest x-ray, US, or substernal extension of mass in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas	• CT Chest with contrast (CPT® 71260)
All other individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas	• Routine preoperative advanced imaging is not considered medically necessary

Medullary Thyroid Carcinomas	Medically Necessary Imaging Study
ANY of the following in individuals with medullary thyroid carcinomas: • Elevated CEA levels • Calcitonin level greater than 300pg/mL • Positive lymph nodes	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen with contrast (CPT® 74160) **or** CT Abdomen without and with contrast (CPT® 74170) • MRI Abdomen without and with contrast (CPT® 74183) • Bone scan (CPT® 78306) see also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes

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Medullary Thyroid Carcinomas	Medically Necessary Imaging Study
Skeletal pain in individuals with medullary thyroid carcinomas	• Bone scan (CPT® 78306) see also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes
Inconclusive findings on conventional imaging in individuals with medullary thyroid carcinomas	• ^{68}Gallium-labeled PET/CT (CPT® 78815)

Anaplastic/Poorly Differentiated Thyroid Carcinomas	Medically Necessary Imaging Study
All individuals with anaplastic/poorly differentiated thyroid carcinomas	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) or MRI Orbit, Face, Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • FDG PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and 76498) • MRI Brain without and with contrast (CPT® 70553)
Skeletal pain in individuals with anaplastic/ poorly differentiated thyroid carcinomas	• Bone scan (CPT® 78306) see also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes

Background and Supporting Information

Thyroid carcinoma includes a heterogeneous group of malignancies arising from follicular epithelial cells (differentiated carcinomas, poorly differentiated carcinomas, and anaplastic carcinoma) and parafollicular C cells (medullary thyroid carcinoma). Differentiated thyroid carcinomas (papillary, follicular, and Hürthle/oncocytic) account for the majority of cases and generally have favorable prognoses, whereas medullary and anaplastic subtypes demonstrate more aggressive biologic behavior and higher rates of regional and distant metastasis (Chakrabarty et al., 2024; Ringel et al., 2025).

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Differentiated thyroid cancers typically retain the ability to concentrate iodine, allowing for functional imaging with radioiodine (RAI) whole body scans to detect residual thyroid tissue and metastatic disease. In contrast, medullary thyroid carcinoma does not demonstrate iodine uptake and requires alternative imaging approaches for staging. Anaplastic thyroid carcinoma is highly aggressive and frequently presents with extensive local invasion and distant metastases at diagnosis, necessitating comprehensive multimodality imaging (Wells et al., 2015; Kushchayev et al., 2019).

Metastatic patterns vary by subtype. Differentiated thyroid cancers most commonly metastasize to lymph nodes and lungs, medullary thyroid carcinoma frequently spreads to lymph nodes, liver, lungs, and bone, and anaplastic carcinoma often involves multiple distant sites, including lung, bone, and brain. These differences in tumor biology inform risk adapted imaging strategies for initial staging (Kushchayev et al., 2019; Chakrabarty et al., 2024).

Evidence Discussion

Evidence supports selective use of cross-sectional imaging for differentiated thyroid carcinomas when there are clinical or ultrasound features suggesting advanced local disease. CT or MRI of the neck improves delineation of tumor extent, including invasion of adjacent structures and nodal involvement, which is critical for surgical planning. Routine preoperative advanced imaging in low-risk individuals without these features has not shown added benefit and may increase exposure to unnecessary contrast and radiation (Chakrabarty et al., 2024; Ringel et al., 2025).

Whole-body radioiodine (RAI) scanning is an essential component of staging in differentiated thyroid cancer following thyroidectomy or when evaluating residual disease. Evidence demonstrates that RAI imaging is highly sensitive for iodine-avid disease and directly influences decisions regarding adjuvant therapy. The addition of SPECT or SPECT/CT improves anatomic localization and diagnostic accuracy. Consideration of prior iodinated contrast exposure is important, as it may interfere with iodine uptake and reduce the effectiveness of RAI imaging if not appropriately timed (Ringel et al., 2025; Chakrabarty et al., 2024).

Medullary thyroid carcinoma demonstrates a higher propensity for early regional and distant metastases, with reported rates of approximately 35% regional and 13% distant disease at presentation. Elevated calcitonin and CEA levels correlate with tumor burden and metastatic risk, supporting the use of comprehensive imaging that includes CT of the neck, chest, and abdomen, along with evaluation for bone metastases in appropriate clinical scenarios. No single modality reliably detects all disease sites, necessitating multimodality staging in higher-risk patients (Wells et al., 2015; Kushchayev et al., 2019).

Functional imaging with PET-based techniques is reserved for cases with inconclusive conventional imaging or high suspicion of metastatic disease. In medullary thyroid

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carcinoma, PET imaging has improved sensitivity in patients with elevated tumor markers and may detect disease not visualized on CT or MRI. Restricting PET imaging to selected indications helps avoid false-positive findings and unnecessary interventions while preserving its diagnostic value when results will influence management (Kushchayev et al., 2019).

Anaplastic thyroid carcinoma requires comprehensive staging at diagnosis due to its aggressive nature and high likelihood of distant metastases, which occur in more than 50% of cases. Combined imaging with CT, PET/CT, and brain imaging provides a complete assessment of disease burden, including vascular, airway, and intracranial involvement, and is essential for determining resectability and guiding urgent multidisciplinary treatment decisions. This intensive imaging approach is justified by the poor prognosis and rapid progression of this disease (Chakrabarty et al., 2024).

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Thyroid Cancer – Restaging/Recurrence (ONC-6.3)

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Criteria

Follicular, Papillary, and Hürthle Cell (Oncocytic) Carcinomas	Medically Necessary Imaging Study
Post-thyroidectomy, if gross residual disease in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas	ONE of the following: • MRI Neck without contrast (CPT® 70540) • MRI Neck without and with contrast (CPT® 70543) • CT Neck with contrast (CPT® 70491) • In individuals with oncocytic carcinomas, CT Chest (contrast as requested)
Prior to and within 2 weeks (ideally 7 to 10 days) following the administration of Radioactive Iodine therapy in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas	• Whole-body thyroid nuclear scan (CPT® 78018) • The following may be approved as an add-on test: ◦ CPT® 78020 to evaluate the degree of iodine uptake ◦ SPECT (CPT® 78803, or CPT® 78831), or SPECT/CT Hybrid study (CPT® 78830, or CPT® 78832)

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Follicular, Papillary, and Hürthle Cell (Oncocytic) Carcinomas	Medically Necessary Imaging Study
ANY of the following in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas: • Recurrence documented by biopsy • Increasing thyroglobulin level without Thyrogen® stimulation • Thyroglobulin level greater than 2 ng/mL or higher than previous after Thyrogen® stimulation • Anti-thyroglobulin antibody present • Evidence of residual thyroid tissue on ultrasound or physical exam after thyroidectomy or ablation	ALL of the following: • CT Neck with contrast (CPT® 70491) or MRI Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260) • CT with contrast of any symptomatic body area • Whole-body Thyroid Nuclear Scan (CPT® 78018) ◦ As an add-on test: ▪ CPT® 78020 to evaluate the degree of iodine uptake ▪ SPECT (CPT® 78803 or CPT® 78831), or SPECT/CT Hybrid study (CPT® 78830, or CPT® 78832)
Individuals with RAI-refractory residual, recurrent and/or distant metastatic follicular, papillary, and Hürthle cell (oncocytic) carcinomas, prior to starting systemic therapy	In addition to the imaging in the box above: • MRI Brain with contrast (CPT® 70552) or without and with contrast (CPT® 70553) OR • CT Head with contrast (CPT® 70460) or without and with contrast (CPT® 70470)
ANY of the following in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas: • Rising thyroglobulin level with negative CT scans AND radioiodine scan • Inconclusive findings on conventional imaging (CT scans and radioiodine scan) • Known radioiodine-refractory disease and CT scans are negative or inconclusive	• FDG PET/CT (CPT® 78815)

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Follicular, Papillary, and Hürthle Cell (Oncocytic) Carcinomas	Medically Necessary Imaging Study
Measurable metastatic disease on systemic therapy (no more often than every 2 cycles) in individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas	• CT Chest with contrast (CPT® 71260) • CT with contrast of affected or symptomatic body area

Medullary Thyroid Carcinoma	Medically Necessary Imaging Study
ANY of the following in individuals with medullary thyroid carcinoma: • Elevated CEA levels • Calcitonin level greater than or equal to 150 pg/mL • Signs or symptoms of recurrence	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) or MRI Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260) • CT Abdomen either with (CPT® 74160) or without and with contrast (CPT® 74170) • Bone scan (CPT® 78306) See also: **Nuclear Medicine (NM) Imaging (ONC-1.3)** in Oncology
Inconclusive conventional imaging with calcitonin greater than or equal to 150 pg per mL in individuals with medullary thyroid carcinoma	• ^{68}Gallium-labeled DOTATATE PET/CT (CPT® 78815)
Calcitonin level greater than 500 in individuals with medullary thyroid carcinoma	ONE of the following: • MRI Abdomen without and with contrast (CPT® 74183) • Whole-body MRI (CPT® 76498)

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Anaplastic/Poorly Differentiated Thyroid Carcinoma	Medically Necessary Imaging Study
Measurable metastatic disease on systemic treatment in individuals with anaplastic/poorly differentiated thyroid carcinoma	Any of the following every 2 cycles (usually every 6-8 weeks): • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT of any other involved/symptomatic sites
Signs or symptoms of recurrence in individuals with anaplastic/poorly differentiated thyroid carcinoma	ONE of the following combinations, not both: • CT Neck with contrast (CPT® 70491), CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177) **OR** • FDG PET/CT (CPT® 78815) In addition to one of the above studies: • MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Recurrence and persistent disease in thyroid carcinoma vary significantly by histologic subtype and initial risk stratification. Differentiated thyroid cancers (DTC), including papillary, follicular, and oncocytic carcinomas, typically demonstrate an indolent course but may recur locally, regionally, or at distant sites, sometimes years after initial treatment. Risk of recurrence ranges widely (<1% to >20%) depending on tumor characteristics such as extrathyroidal extension, nodal involvement, vascular invasion, and molecular features (Filetti et al., 2019).

Post-treatment surveillance and detection of recurrence rely on a combination of clinical examination, laboratory testing (thyroglobulin and anti thyroglobulin antibodies), and imaging. Rising thyroglobulin levels, particularly when increasing over time, are strongly suggestive of persistent or recurrent disease even in the absence of structural findings on ultrasound or cross sectional imaging (Filetti et al., 2019; NCCN, 2025).

Radioiodine (RAI) imaging plays a central role in restaging differentiated thyroid cancer due to the iodine avid nature of most tumor cells. Whole body RAI scanning following

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therapy allows detection of residual or metastatic disease and assessment of iodine avidity, which directly influences further management. However, a subset of tumors loses iodine concentrating ability over time, resulting in RAI refractory disease that requires alternative imaging strategies (Filetti et al., 2019).

Medullary thyroid carcinoma (MTC) and anaplastic thyroid carcinoma (ATC) require different restaging approaches due to their biologic behavior. MTC is often associated with biochemical recurrence based on calcitonin and carcinoembryonic antigen levels, with imaging directed by tumor marker elevation and clinical suspicion. ATC is highly aggressive, frequently presenting with widespread disease and requiring comprehensive imaging to evaluate the full extent of recurrence or progression (Filetti et al., 2019; NCCN, 2025).

Evidence Discussion

For differentiated thyroid carcinomas, imaging after thyroidectomy is guided by biochemical and clinical indicators of recurrence. When gross residual disease is present, cross-sectional imaging with contrast-enhanced CT or MRI provides essential delineation of local disease extent and guides further treatment planning. Following RAI therapy, whole-body radioiodine scanning performed within approximately 1–2 weeks is supported to evaluate treatment response and document iodine uptake, which is critical in determining whether additional RAI therapy will be effective (Filetti et al., 2019; NCCN, 2025).

In cases of suspected recurrence based on biopsy, rising thyroglobulin levels, or suspicious clinical or ultrasound findings, combined anatomic and functional imaging is supported. CT or MRI of the neck and CT of the chest are used to detect locoregional and pulmonary metastases, while whole-body RAI scanning evaluates iodine-avid disease. This multimodality approach ensures comprehensive restaging and directly informs decisions regarding surgery, additional RAI therapy, or systemic treatment (Filetti et al., 2019).

FDG PET/CT is reserved for patients with rising thyroglobulin and negative conventional imaging or known RAI-refractory disease. Evidence demonstrates high sensitivity (approximately 94%) and specificity (approximately 80%–84%) for detection of metabolically active disease in this setting, with FDG uptake correlating with tumor aggressiveness and poor response to RAI therapy. Restricting PET/CT to these scenarios minimizes false-positive findings and unnecessary interventions while preserving its clinical value (Filetti et al., 2019).

For medullary thyroid carcinoma, imaging is guided by biochemical markers, particularly calcitonin and CEA levels. Elevated or rising levels, especially above clinically significant thresholds, are associated with increased likelihood of regional and distant metastases, supporting the use of CT-based imaging and bone scans to evaluate disease burden. Advanced functional imaging using somatostatin receptor–based PET techniques is

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considered medically necessary when conventional imaging is inconclusive, given improved sensitivity in detecting metastatic disease (Filetti et al., 2019).

Anaplastic thyroid carcinoma requires aggressive restaging due to its rapid progression and high incidence of distant metastases at recurrence. Comprehensive imaging, including CT, PET/CT, and brain MRI, is supported to fully characterize disease extent, guide systemic therapy decisions, and assess response during treatment. Frequent interval imaging during systemic therapy allows timely identification of progression while balancing the need to monitor disease with avoidance of excessive imaging (Filetti et al., 2019; NCCN, 2025).

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Thyroid Cancer – Surveillance/Follow-up (ONC-6.4)

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Criteria

Follicular, Papillary, and Hürthle Cell (Oncocytic) Carcinomas	Medically Necessary Imaging Study
Individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas being monitored on active surveillance	• Neck ultrasound (CPT® 76536) every 6 months for 2 years, and then annually thereafter
All other individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas post-treatment	• Neck ultrasound (CPT® 76536) once at 6-12 months post-treatment, and then annually thereafter
For individuals with follicular, papillary, and Hürthle cell (oncocytic) carcinomas with ANY of the following: • Node positive disease • RAI-avid metastases	• Whole-body Thyroid Nuclear Scan annually (CPT® 78018) ◦ CPT® 78020 as an add-on test to evaluate the degree of iodine uptake AND/OR • SPECT (CPT® 78803, or CPT® 78831), OR SPECT/CT Hybrid study (CPT® 78830, or CPT® 78832)

Medullary Carcinomas	Medically Necessary Imaging Study
All individuals with medullary carcinomas	• CEA and calcitonin are required for monitoring medullary carcinomas • Routine surveillance imaging is not considered medically necessary

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Anaplastic/Poorly Differentiated Thyroid Carcinomas	Medically Necessary Imaging Study
All individuals with anaplastic/ poorly differentiated thyroid carcinomas	Every 3 months for 2 years: • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Surveillance strategies in thyroid cancer are guided by histologic subtype, initial stage, and risk of recurrence. Differentiated thyroid carcinomas (papillary, follicular, and oncocytic) are generally associated with favorable outcomes but demonstrate variable recurrence risk depending on tumor size, nodal involvement, extrathyroidal extension, and molecular characteristics. Long term monitoring is therefore risk adapted and integrates clinical assessment, laboratory findings, and selective imaging (Chakrabarty et al., 2024).

Evidence Discussion

Evidence supports ultrasound-based surveillance as the primary imaging modality for differentiated thyroid carcinomas due to its high sensitivity for detecting local recurrence and lack of radiation exposure. Studies summarized in clinical guidelines demonstrate that most clinically relevant recurrences occur in the neck and can be effectively identified with ultrasound in conjunction with serum thyroglobulin monitoring. Limiting imaging to ultrasound in low-risk individuals reduces unnecessary radiation exposure and avoids false-positive findings associated with routine cross-sectional imaging (Chakrabarty et al., 2024; NCCN, 2025).

In patients with higher-risk features, including node-positive disease or known RAI-avid metastases, periodic whole-body radioiodine scanning is supported to detect residual or recurrent iodine-avid disease. Evidence indicates that these scans can identify occult metastases and inform decisions regarding additional RAI therapy. The addition of SPECT or SPECT/CT improves lesion localization and diagnostic confidence, particularly in anatomically complex regions (Chakrabarty et al., 2024).

For medullary thyroid carcinoma, surveillance imaging is not routinely supported in the absence of clinical or biochemical evidence of recurrence. Serum calcitonin and CEA levels are highly sensitive markers of disease activity and are used to guide further evaluation. Imaging is reserved for cases with rising markers or clinical suspicion,

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thereby avoiding unnecessary imaging in asymptomatic individuals while maintaining sensitivity for clinically meaningful disease (NCCN, 2025).

Anaplastic and poorly differentiated thyroid carcinomas carry a high risk of early recurrence and rapid disease progression, with most relapses occurring within the first two years after diagnosis. Frequent cross-sectional imaging, including CT and MRI, is supported in this population to detect progression and guide treatment decisions in a timely manner. This intensive surveillance strategy reflects the aggressive biology of these tumors and balances the need for early detection against the risks of repeated imaging, which are justified given the poor prognosis and high likelihood of recurrence (Chakrabarty et al., 2024; NCCN, 2025).

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Small Cell Lung Cancer (ONC-7)

Guideline

Small Cell Lung Cancer – General Considerations (ONC-7.0)
Small Cell Lung Cancer – Suspected/Diagnosis (ONC-7.1)
Small Cell Lung Cancer – Initial Work-up/Staging (ONC-7.2)
Small Cell Lung Cancer – Restaging/Recurrence (ONC-7.3)
Small Cell Lung Cancer – Surveillance/Follow-up (ONC-7.4)
References (ONC-7)

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Small Cell Lung Cancer – General Considerations (ONC-7.0)

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Criteria

- Combined histologies of small and non-small cell are considered small cell lung cancer (SCLC). Use this guideline for imaging recommendations for small and large cell high-grade (poorly differentiated) neuroendocrine tumors of the lung.
- Imaging is presently guided by traditional staging of limited or extensive disease.
  - Extensive stage is either metastatic disease or an extent which cannot be encompassed by a single radiotherapy portal.
  - Limited staging is confined to one side of the chest.
- Individuals treated curatively for SCLC are at increased risk for developing a second lung cancer. If new lung nodule is seen on imaging without any evidence of other systemic disease, follow **Lung Metastases (ONC-31.1)** for work-up of nodule.
- For carcinoid (low-grade neuroendocrine tumors) of the lung, see: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)**.

Background and Supporting Information

Small cell lung cancer (SCLC) is a high grade, poorly differentiated neuroendocrine carcinoma characterized by rapid growth, early metastatic spread, and strong association with tobacco use. It accounts for approximately 13% of lung cancers and demonstrates aggressive clinical behavior, with most patients presenting with advanced disease at diagnosis (NCCN, 2026; NCI, 2024).

The biology of SCLC is notable for early hematogenous dissemination, with common metastatic sites including the brain, liver, adrenal glands, bone, and contralateral lung. Brain metastases are particularly common, and a substantial proportion of patients may have asymptomatic central nervous system involvement at diagnosis, underscoring the importance of appropriate imaging strategies (NCCN, 2026).

Evidence Discussion

Evidence supports imaging strategies in SCLC that are tailored to its highly aggressive biology and simplified staging system. Because SCLC is characterized by rapid growth and early widespread metastases, imaging plays a critical role in determining whether disease is limited or extensive, which directly influences treatment planning and prognosis (NCCN, 2026; NCI, 2024).

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The use of a limited versus extensive staging framework allows clinicians to align imaging intensity with disease burden. Limited stage disease may be encompassed within a single radiation field, while extensive stage disease requires systemic therapy due to disseminated involvement. This dichotomous approach simplifies clinical decision making and avoids unnecessary imaging beyond what is required to establish disease extent (NCCN, 2026).

SCLC's propensity for early metastasis, particularly to the brain and distant organs, supports the use of comprehensive imaging when clinically indicated. However, routine screening modalities, such as low dose CT, are less effective for detecting SCLC at an early stage because of its rapid doubling time and tendency to progress between screening intervals. This limits the benefit of screening based imaging for SCLC compared with other lung cancer subtypes (NCCN, 2026; USPSTF, 2021).

Additionally, individuals treated for SCLC remain at increased risk for developing second primary lung cancers, particularly due to shared risk factors such as smoking. Imaging strategies must therefore balance detection of recurrence or new primary tumors with avoidance of unnecessary imaging and associated harms, including radiation exposure and false positive findings. A risk adapted approach ensures that imaging is used when it is most likely to influence management while minimizing unnecessary interventions (NCCN, 2026; NCI, 2024).

Health Equity Considerations

Small cell lung cancer (SCLC) is characterized by aggressive tumor biology, rapid progression, and a strong association with tobacco exposure, factors that limit opportunities for early detection and contribute to poor overall outcomes. Population-level data demonstrate that SCLC is more frequently diagnosed at advanced or metastatic stages compared with non–small cell lung cancer, with over two-thirds of cases presenting with distant disease at diagnosis (Monestime et al., 2023). Structural inequities compound this biologic aggressiveness. Individuals from racial and ethnic minority groups, lower socioeconomic strata, and rural communities experience higher smoking prevalence, delayed access to diagnostic evaluation, and lower likelihood of timely treatment initiation, resulting in worse survival (Bade et al., 2025; American Lung Association, 2025). Although lung cancer screening has improved stage distribution for NSCLC, current screening paradigms are less effective for SCLC due to its rapid growth kinetics, limiting the potential mitigating effect of population-based screening on equity gaps (USPSTF, 2021; Monestime et al., 2023).

Disparities also extend to imaging utilization and treatment pathways following diagnosis. Black individuals and individuals with public or no insurance are less likely to receive guideline-concordant systemic therapy, prophylactic cranial irradiation, or consolidative thoracic radiation for extensive-stage SCLC, even when clinically appropriate (Bade et al., 2025; Monestime et al., 2023). Geographic

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barriers, transportation limitations, and care fragmentation further delay staging and response-assessment imaging in underserved populations, increasing the risk of missed opportunities to guide timely management decisions (Shehata et al., 2025). Awareness of these inequities highlights the importance of consistent, evidence-based imaging criteria for diagnosis, staging, and surveillance in SCLC, supporting equitable clinical decision-making across diverse populations regardless of social or structural barriers.

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Small Cell Lung Cancer – Suspected/ Diagnosis (ONC-7.1)

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Criteria

Indication	Medically Necessary Imaging Study
• Abnormal chest x-ray or clinical suspicion for small cell lung cancer remains high despite a normal chest x-ray in symptomatic individual	• CT Chest without contrast (CPT® 71250) **or** • CT Chest with contrast (CPT® 71260)
• Pulmonary nodule less than 8mm in size noted on CT Chest in individuals with suspected small cell lung cancer	• See: **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)** in the Chest Imaging Guidelines
• Pulmonary nodule 8mm (0.8cm) to 30mm (3cm) seen on dedicated chest imaging in individuals with suspected small cell lung cancer (See **Solitary Pulmonary Nodule - Imaging (CH-16.1)**)	• PET/CT (CPT® 78815) • PET is Positive: Qualifies as initial staging PET/CT

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Indication	Medically Necessary Imaging Study
• Pulmonary mass 31mm (3.1cm) or greater seen on CT or MRI in individuals with suspected small cell lung cancer	• PET/CT (CPT® 78815) prior to biopsy if ONE OR MORE of the following applies: ◦ Definitive treatment with resection or radiation will be utilized instead of biopsy if PET confirms limited disease ◦ Multiple possible biopsy options are present within the chest and PET findings will be used to determine the most favorable biopsy site • Biopsy is considered medically necessary prior to PET imaging for all other indications in pulmonary masses greater than or equal to 31mm (3.1cm) in size
• Mediastinal/Hilar Mass in individuals with suspected small cell lung cancer	See: **Lymphadenopathy (CH-2)** in the Chest Imaging Guidelines
• Paraneoplastic syndrome suspected	See: **Paraneoplastic Syndromes (ONC-30.3)**

Background and Supporting Information

Small cell lung cancer (SCLC) is an aggressive neuroendocrine malignancy characterized by rapid tumor growth, high mitotic rate, and early metastatic dissemination. It is strongly associated with tobacco exposure and often presents with advanced disease at the time of diagnosis due to its rapid progression and early involvement of distant sites (NCCN, 2026; NCI, 2024).

Individuals commonly present with respiratory symptoms such as cough, dyspnea, hemoptysis, or systemic symptoms including weight loss and fatigue. Paraneoplastic syndromes are also frequently associated with SCLC due to ectopic hormone production. Initial clinical suspicion often arises from abnormal chest imaging, including chest radiography or CT findings, which then prompt further diagnostic evaluation (NCCN, 2026).

SCLC frequently presents as a centrally located mass with mediastinal or hilar lymphadenopathy. Rapid doubling time and early dissemination to organs such as the brain, liver, bone, and adrenal glands are hallmarks of the disease. Brain metastases may be present at diagnosis or develop early in the disease course, often before onset of neurologic symptoms (Gaebe et al., 2024).

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Definitive diagnosis requires histologic confirmation, typically obtained via biopsy of the primary lung lesion or metastatic site. Imaging plays a key role in identifying suspicious lesions, guiding biopsy site selection, and determining the most appropriate initial diagnostic pathway. The choice and sequence of imaging modalities are therefore determined by lesion size, accessibility, and clinical context (NCCN, 2026).

Evidence Discussion

Evidence supports CT imaging of the chest as the initial diagnostic modality in individuals with suspected small cell lung cancer based on abnormal chest radiography or persistent clinical suspicion. CT provides detailed anatomic characterization of pulmonary lesions, mediastinal involvement, and potential metastatic sites within the thorax, allowing for accurate identification of lesions requiring biopsy. Both contrast and non contrast CT may be appropriate depending on clinical circumstances, with contrast enhancing evaluation of mediastinal structures (NCCN, 2026).

For pulmonary nodules measuring 8mm or greater, FDG-PET/CT demonstrates improved sensitivity and specificity for detecting metabolically active malignancy and is supported to further characterize indeterminate lesions. A positive PET/CT in this setting can serve as the initial staging study, reducing the need for redundant imaging. However, PET is not recommended for very small nodules due to reduced sensitivity and increased likelihood of false negative results (NCI, 2024).

In larger pulmonary masses, particularly those measuring greater than 3cm, tissue diagnosis remains the priority. PET/CT may be used selectively prior to biopsy when results are expected to influence clinical management, such as identifying the most accessible or highest yield biopsy site or when definitive local therapy is being considered without biopsy. This selective approach minimizes unnecessary delays in diagnosis while optimizing procedural safety and diagnostic yield (NCCN, 2026).

FDG remains the radiotracer of choice for PET imaging in SCLC due to its high uptake in rapidly proliferating tumors. In contrast, somatostatin receptor–based imaging techniques have uncertain sensitivity and specificity in SCLC and are not considered medically necessary for routine diagnostic evaluation. This distinction is important given the neuroendocrine features of SCLC, which do not reliably translate to consistent uptake on somatostatin receptor imaging studies (NCI, 2024).

Overall, limiting advanced imaging to clinically appropriate scenarios ensures accurate diagnosis while reducing unnecessary radiation exposure, false positive findings, and downstream procedures. Imaging strategies in suspected SCLC are therefore guided by lesion characteristics, clinical suspicion, and the need to efficiently establish a tissue diagnosis that directs treatment planning (NCCN, 2026).

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Small Cell Lung Cancer – Initial Work-up/ Staging (ONC-7.2)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging in individuals with small cell lung cancer	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Brain without and with contrast (CPT® 70553) • Bone scan (CPT® 78306), if PET/CT not being done or not available (See also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)
• To confirm the extent of disease in individuals with small cell lung cancer when initial CT Chest/ Abdomen/Pelvis and MRI Brain indicate limited stage disease (confined to one side of the chest) • To evaluate inconclusive findings on conventional imaging in individuals with small cell lung cancer	• PET/CT (CPT® 78815)
• Inconclusive bone findings on PET/CT or bone scan in individuals with small cell lung cancer	• MRI without and with contrast of the involved body site

Background and Supporting Information

Small cell lung cancer (SCLC) is an aggressive malignancy with rapid growth kinetics and a high propensity for early hematogenous dissemination. At diagnosis, the majority

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of patients present with metastatic disease, with approximately two-thirds having distant involvement and a significant subset demonstrating central nervous system metastases (NCCN, 2026; Gaebe et al., 2024).

Staging of SCLC is essential to distinguish limited stage disease, which is confined to one hemithorax and may be treated with curative intent, from extensive stage disease, which includes distant metastases and requires systemic therapy. Comprehensive imaging is required to accurately determine disease burden and to guide therapeutic planning (NCCN, 2026).

Evidence Discussion

The use of contrast-enhanced CT of the chest, abdomen, and pelvis, along with MRI of the brain, is supported for initial staging in small cell lung cancer due to the high prevalence of metastatic disease at presentation. Evidence demonstrates that most patients have disseminated disease at diagnosis, and a clinically meaningful proportion harbor central nervous system metastases, often asymptomatic. Comprehensive anatomic imaging therefore improves detection of both thoracic and extrathoracic disease and is critical for accurate staging and treatment selection (NCCN, 2026; Gaebe et al., 2024).

FDG-PET/CT has demonstrated value in refining staging accuracy when conventional imaging suggests limited-stage disease or yields inconclusive findings. Studies indicate that PET/CT can result in stage migration in a substantial proportion of patients, identifying occult metastatic disease not detected on CT alone. This prevents inappropriate assignment of limited-stage disease and reduces the risk of overtreatment with curative intent therapies in patients with unrecognized extensive disease (NCCN, 2026).

However, PET/CT is not universally required in all patients. When prior PET/CT has already been performed during initial evaluation or when conventional imaging clearly demonstrates extensive-stage disease, additional PET/CT imaging does not meaningfully alter management and may expose patients to unnecessary radiation and cost. This supports a selective approach to PET/CT use based on clinical context and prior imaging (NCCN, 2026).

Evaluation of osseous metastatic disease is also important, as bone involvement is common in SCLC. Bone scan or PET/CT can identify skeletal metastases, and targeted MRI may be used to clarify equivocal findings. This tiered approach balances sensitivity for detecting metastatic disease with avoidance of unnecessary imaging, ensuring that additional studies are reserved for situations where results will influence staging accuracy or clinical management (NCCN, 2026; NCI, 2024).

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Small Cell Lung Cancer – Restaging/ Recurrence (ONC-7.3)

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Criteria

Indication	Medically Necessary Imaging Study
Treatment response in individuals with small cell lung cancer treated with sequential chemotherapy-radiation or chemotherapy alone* *For individuals receiving systemic therapy and concurrent radiation therapy, response assessment is recommended only after completion of initial therapy (see box below).	After every 2 cycles, ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Brain without and with contrast (CPT® 70553) for measurable brain metastases being treated with systemic therapy • Bone scan (CPT® 78306) (See also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • PET is not considered medically necessary for evaluation of treatment response in SCLC but can be considered on a case-by-case basis.
Following completion of planned treatment in individuals with small cell lung cancer: • Chemoradiation • Adjuvant chemotherapy • Radiation	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Brain without and with contrast (CPT® 70553) for measurable brain metastases being treated with systemic therapy • Bone scan (CPT® 78306) (See also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3**) for additional bone scan codes)

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Indication	Medically Necessary Imaging Study
Restaging (suspected recurrence) in individuals with small cell lung cancer	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Brain without and with contrast (CPT® 70553) • Bone scan (CPT® 78306) (See: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • PET is not considered medically necessary for evaluation of recurrent SCLC but can be considered on a case-by-case basis.
For response assessment following primary treatment in individuals with small cell lung cancer	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Small cell lung cancer (SCLC) is characterized by rapid proliferation, early response to therapy, and high rates of relapse. Although many patients initially respond to chemotherapy and radiation therapy, recurrent disease is common and typically occurs within the first 1–2 years following treatment. The pattern of relapse may involve the thorax, distant organs, or the central nervous system, reflecting the systemic nature of the disease (NCCN, 2026; NCI, 2024).

Evidence Discussion

Evidence supports the use of serial contrast-enhanced CT of the chest, abdomen, and pelvis for response assessment in SCLC during active therapy. Imaging after every two cycles of chemotherapy allows timely evaluation of tumor response or progression, enabling modification of treatment when necessary. This interval balances the need for close monitoring of a rapidly evolving disease with avoidance of excessive imaging (NCCN, 2026; NCI, 2024).

Brain metastases are particularly important in SCLC surveillance because they may be present without neurologic symptoms and can significantly influence management decisions. MRI of the brain is supported when there is known or suspected central nervous system involvement or when evaluating response of brain metastases to systemic therapy. Additionally, brain imaging at completion of initial therapy is supported in patients being considered for prophylactic cranial irradiation, as a proportion of

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patients may harbor asymptomatic metastases that would alter management and avoid unnecessary exposure to neurotoxic radiation (NCCN, 2026).

Following completion of treatment, cross-sectional imaging continues to play a central role in detecting residual or recurrent disease. CT imaging of the chest, abdomen, and pelvis, along with brain MRI and bone imaging when indicated, allows comprehensive reassessment of disease burden. This approach is supported by the high likelihood of relapse and the potential for recurrence in multiple organ systems (NCCN, 2026; NCI, 2024).

FDG-PET/CT has not demonstrated consistent benefit for routine response assessment or surveillance in SCLC. While emerging evidence suggests a potential role in selected scenarios, particularly in evaluating equivocal findings or osseous disease, current guidelines do not support its routine use due to variable impact on management and potential for false-positive results. Restricting PET/CT to case-by-case use aligns with evidence-based practice and minimizes unnecessary imaging and downstream interventions (NCCN, 2026).

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Small Cell Lung Cancer – Surveillance/ Follow-up (ONC-7.4)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with small cell lung cancer	Every 2-6 months for two years, then no more frequently than every 6 months thereafter: • CT Chest without (CPT® 71250) or CT Chest with (CPT® 71260) contrast • CT Abdomen and Pelvis with contrast (CPT® 74177)
Screening for brain metastases in individuals with small cell lung cancer, regardless of PCI status	• MRI Brain without and with contrast (CPT® 70553) every 3-4 months for 1 year and then every 6 months in year 2, subsequently only for signs and symptoms of recurrence
Surveillance of known and/ or treated brain metastases in individuals with small cell lung cancer	• See: **Brain Metastases (ONC-31.3)**
New lung nodule(s) in individuals with small cell lung cancer	• See: **Lung Metastases (ONC-31.1)**

Background and Supporting Information

Small cell lung cancer (SCLC) demonstrates a high rate of relapse despite initial responsiveness to therapy. Most recurrences occur within the first two years following treatment, although late recurrences and second primary lung cancers may also develop. Surveillance strategies are therefore designed to detect recurrence early while balancing the risks of frequent imaging (NCCN, 2026; NCI, 2024).

Patterns of recurrence commonly involve both locoregional and distant sites, with frequent metastases to the liver, adrenal glands, bone, and brain. Central nervous system involvement is particularly common in SCLC and may occur even in patients

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without neurologic symptoms, necessitating consideration of routine brain imaging in follow up (NCCN, 2026; Gaebe et al., 2024).

Evidence Discussion

Evidence supports routine surveillance with contrast-enhanced CT of the chest, abdomen, and pelvis due to the high likelihood of recurrence and the propensity of SCLC to involve multiple organ systems. CT imaging provides reliable detection of thoracic recurrence and distant metastases and is favored over alternative modalities such as MRI of the chest, which demonstrates lower sensitivity for pulmonary lesions. Tailored surveillance intervals reflect the natural history of SCLC, with more frequent imaging during the first two years when recurrence risk is highest (NCCN, 2026; NCI, 2024).

Routine surveillance of the brain with MRI is supported regardless of prior prophylactic cranial irradiation status due to the high incidence of brain metastases in SCLC, reported in up to 30% of patients. MRI provides superior sensitivity and specificity for detection of intracranial disease compared with CT and allows earlier intervention before development of neurologic deficits. Early detection is particularly important given the clinical impact of brain metastases on prognosis and quality of life (NCCN, 2026; Gaebe et al., 2024).

PET/CT is not routinely supported for surveillance due to its limited incremental benefit in this setting and its association with increased radiation exposure, false-positive findings, and higher cost. Limiting PET/CT to select cases where conventional imaging is inconclusive helps avoid unnecessary downstream testing and supports efficient, evidence-based imaging utilization while maintaining diagnostic accuracy for clinically significant recurrence (NCCN, 2026; NCI, 2024).

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Non-Small Cell Lung Cancer (ONC-8)

Guideline

Non-Small Cell Lung Cancer – General Considerations (ONC-8.0)
Non-Small Cell Lung Cancer – Asymptomatic Screening (ONC-8.1)
Non-Small Cell Lung Cancer – Suspected/Diagnosis (ONC-8.2)
Non-Small Cell Lung Cancer – Initial Work-up/Staging (ONC-8.3)
Non-Small Cell Lung Cancer – Restaging/Recurrence (ONC-8.4)
Non-Small Cell Lung Cancer – Surveillance/Follow-up (ONC-8.5)
References (ONC-8)

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Non-Small Cell Lung Cancer – General Considerations (ONC-8.0)

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Criteria

- See: **Bronchopulmonary or Thymic Carcinoid – Initial Staging (ONC-15.6)** for evaluation of low-grade neuroendocrine tumors (carcinoid) of the lung.
- See: **Small Cell Lung Cancer (ONC-7)** for evaluation of high-grade small cell and large cell neuroendocrine tumors of the lung.
- PET/CT is considered medically necessary to confirm solitary focus of extra-pulmonary metastatic disease (i.e., brain or adrenal) if the individual is being considered for an aggressive treatment for oligometastatic disease.

Background and Supporting Information

Non small cell lung cancer (NSCLC) represents the majority of lung cancers and includes several histologic subtypes, most commonly adenocarcinoma, squamous cell carcinoma, adenosquamous carcinoma, and large cell carcinoma. These tumors are characterized by distinct morphologic and molecular features that guide diagnosis, staging, and treatment selection (NCCN, 2026).

NSCLC is a biologically heterogeneous disease that may range from early stage, localized tumors amenable to surgical resection to advanced metastatic disease requiring systemic therapy. Accurate staging is critical, as treatment strategies and prognosis vary significantly by disease extent. The tumor, node, metastasis (TNM) classification system is used to stratify disease and guide management decisions (NCCN, 2026).

Metastatic spread in NSCLC may involve intrathoracic lymph nodes, contralateral lung, pleura, brain, adrenal glands, bone, and other distant sites. The concept of oligometastatic disease, characterized by a limited number of metastatic lesions, has emerged as a clinically distinct subset in which aggressive local therapy to both primary and metastatic sites may provide benefit in selected individuals (NCCN, 2026).

Diagnostic evaluation and treatment planning for NSCLC require a multidisciplinary approach involving thoracic radiology, pulmonology, surgery, medical oncology, and radiation oncology. Imaging plays a central role in identifying disease extent, guiding biopsy, and determining candidacy for surgical or other local therapies, particularly in patients with potentially limited metastatic disease (NCCN, 2026).

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Evidence Discussion

The use of PET/CT in NSCLC is supported as a problem-solving and staging tool, particularly in patients with suspected limited metastatic disease who are being considered for aggressive local therapy. Evidence demonstrates that FDG PET/CT improves detection of occult metastatic disease compared with conventional imaging and can alter staging and management decisions, especially in identifying or confirming extra pulmonary metastatic sites such as adrenal or distant lesions (NCCN, 2026).

In the context of oligometastatic disease, accurate confirmation of a solitary metastatic focus is critical, as treatment strategies may shift toward curative intent local therapy rather than palliative systemic management. NCCN guidance supports the need for confirmation of suspected metastatic lesions, often requiring additional imaging or tissue sampling, to ensure appropriate patient selection for aggressive interventions such as surgery or stereotactic ablative radiotherapy (NCCN, 2026).

FDG PET/CT provides functional information regarding tumor metabolism, which complements anatomic imaging. However, its use must be interpreted cautiously due to known limitations, including false positive findings from inflammatory or infectious processes and false negative results in lesions with low metabolic activity or small size. For this reason, positive PET findings, particularly in mediastinal nodes or distant sites, often require pathologic or additional radiologic confirmation before treatment decisions are finalized (NCCN, 2026).

Restricting PET/CT use to clinically relevant scenarios such as confirming solitary metastatic disease in patients eligible for definitive therapy balances its diagnostic benefits against potential harms, including unnecessary radiation exposure, false positive findings, and downstream procedures. This selective, indication driven approach ensures that PET/CT is utilized when it is most likely to impact management and improve outcomes in patients with NSCLC (NCCN, 2026).

Health Equity Considerations

Non-small cell lung cancer (NSCLC) accounts for the majority of lung cancer diagnoses and demonstrates substantial disparities across the diagnostic and treatment continuum. Racial and ethnic minority populations, particularly Black individuals, are more likely to be diagnosed at younger ages and with more advanced disease compared with White individuals, even after accounting for smoking exposure, suggesting the influence of structural, environmental, and health system factors (American Lung Association, 2025; Odera et al., 2022). Disparities in lung cancer screening eligibility and uptake contribute to these patterns; current low-dose CT screening criteria, while expanded in 2021, continue to under-identify individuals at highest risk among socioeconomically disadvantaged and minority populations, resulting in fewer early-stage diagnoses amenable to curative treatment (USPSTF, 2021; Monestime et al., 2023). Variability

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in access to diagnostic imaging and timely staging further exacerbates inequities in treatment planning and outcomes (Shehata et al., 2025).

Following diagnosis, inequities persist in imaging utilization, molecular testing, and receipt of guideline-concordant care. Black, Hispanic/Latino, uninsured, and Medicaid-insured individuals are less likely to receive comprehensive staging evaluations, positron emission tomography, and molecular or genomic testing that informs targeted therapy selection in NSCLC (Shehata et al., 2025; Odera et al., 2022). These gaps are associated with lower rates of curative surgery, reduced access to targeted and immunotherapies, and worse survival outcomes, despite evidence that patients derive similar benefit when treated equitably (American Lung Association, 2025; Monestime et al., 2023). Geographic barriers, including rural residence and limited proximity to high-volume cancer centers, further affect access to advanced imaging and follow-up surveillance. Recognition of these structural inequities underscores the importance of standardized, evidence-based imaging criteria in NSCLC to support equitable staging, treatment assessment, and surveillance across diverse patient populations irrespective of social or economic context.

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Non-Small Cell Lung Cancer – Asymptomatic Screening (ONC-8.1)

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- See: **Lung Cancer Screening (CH-33)** in the Chest Imaging Guidelines for criteria for Low-dose CT Chest for lung cancer screening.

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Non-Small Cell Lung Cancer – Suspected/Diagnosis (ONC-8.2)

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Criteria

Indication	Medically Necessary Imaging Study
Abnormal chest x-ray or clinical suspicion for non-small cell lung cancer remains high despite a normal chest x-ray in symptomatic individual	• CT Chest without contrast (CPT® 71250) **or** • CT Chest with contrast (CPT® 71260)
Pulmonary nodule less than 8mm in size noted on CT Chest	• See: **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)** in the Chest Imaging Guidelines
Pulmonary nodule 8mm (0.8cm) to 30mm (3cm) seen on dedicated chest imaging (See **Solitary Pulmonary Nodule - Imaging (CH-16.1)**)	• PET/CT (CPT® 78815) • If PET is Positive: Qualifies as initial staging PET/CT
Pulmonary mass 31mm (3.1cm) or greater seen on CT or MRI	• PET/CT (CPT® 78815) prior to biopsy if ONE or MORE of the following applies: ◦ Definitive treatment with resection or radiation will be utilized instead of biopsy if PET confirms limited disease ◦ Multiple possible biopsy options are present within the chest and PET findings will be used to determine the most favorable biopsy site • Biopsy is indicated prior to PET imaging for all other indications in pulmonary masses ≥31mm (3.1cm) in size

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Indication	Medically Necessary Imaging Study
Mediastinal/Hilar Lymphadenopathy	See: **Mediastinal Lymphadenopathy (CH-2.3)** in the Chest Imaging Guidelines
Mediastinal/Hilar Mass	See: **Mediastinal Mass (CH-20)** in the Chest Imaging Guidelines
Paraneoplastic syndrome suspected	See: **Paraneoplastic Syndromes (ONC-30.3)**

Background and Supporting Information

Non-small cell lung cancer (NSCLC) encompasses multiple histologic subtypes and typically presents as a pulmonary nodule or mass identified on chest imaging. Pulmonary nodules are common and may represent benign etiologies such as granulomatous disease, intrapulmonary lymph nodes, or infection; however, a subset represents early lung cancer, necessitating structured diagnostic evaluation (NCCN, 2026; MacMahon et al., 2017).

Risk stratification in suspected NSCLC is based on clinical and imaging features, including patient age, smoking history, nodule size, morphology, and location. Nodule size is one of the most important predictors of malignancy risk; smaller nodules have a low probability of cancer, whereas larger nodules and masses demonstrate progressively higher risk (MacMahon et al., 2017).

Evidence Discussion

CT imaging of the chest is the initial diagnostic modality in individuals with abnormal chest radiography or persistent clinical suspicion of lung cancer. CT provides high-resolution anatomic detail that allows for detection and characterization of pulmonary nodules, assessment of morphology, and identification of associated findings. Evidence demonstrates that CT is far more sensitive than chest radiography for detecting small nodules, many of which are not visible on plain films, ensuring early and accurate identification of suspicious lesions (MacMahon et al., 2017).

The distinction between small pulmonary nodules and larger lesions is clinically significant. Nodules less than 8mm carry a low probability of malignancy, often less than 1% in low-risk patients, and are typically managed with surveillance strategies rather than immediate advanced imaging or invasive procedures. In contrast, nodules 8mm or greater demonstrate increasing malignancy risk and warrant further evaluation, including PET/CT or tissue sampling, depending on clinical context (MacMahon et al., 2017).

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FDG PET/CT is supported in the evaluation of nodules great than or equal to 8mm because it provides metabolic characterization that complements CT morphology. However, PET/CT has known limitations, including false-positive results caused by infection or inflammation and reduced sensitivity in small or low-metabolic lesions. Despite these limitations, PET/CT can meaningfully influence management by identifying metabolically active disease and, when positive, may serve as the initial staging study (NCCN, 2026).

For lesions measuring greater than 3cm, which are considered masses, tissue diagnosis is generally preferred over additional imaging due to the high likelihood of malignancy. Evidence indicates that reliance on imaging alone may delay definitive diagnosis. However, PET/CT may be selectively used prior to biopsy when results will influence management, such as confirming limited disease for definitive therapy or identifying the optimal biopsy site among multiple candidates. This selective approach improves procedural safety and efficiency while avoiding unnecessary imaging and interventions (NCCN, 2026).

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Non-Small Cell Lung Cancer – Initial Work-up/Staging (ONC-8.3)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with non-small cell lung cancer	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen with contrast (CPT® 74160) ◦ CT Abdomen can be omitted if CT Chest report clearly documents upper abdomen through level of adrenals • PET/CT (CPT® 78815) (if not already completed prior to histological diagnosis) • Bone scan (CPT® 78306, if PET/CT not being done) See also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes
Stage IB-IV non-small cell lung cancer	• MRI Brain without and with contrast (CPT® 70553) ◦ If MRI Brain is contraindicated or not available, CT Head with contrast (CPT® 70460) or CT Head without and with contrast (CPT® 70470)
Superior sulcus (Pancoast) tumor suspected in individuals with non-small cell lung cancer	ANY or ALL of the following: • MRI Chest without and with contrast (CPT® 71552) • MRI Cervical Spine without and with contrast (CPT® 72156) • MRI Thoracic Spine without and with contrast (CPT® 72157)

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Background and Supporting Information

Non-small cell lung cancer (NSCLC) is staged using the TNM classification system, which defines tumor extent, nodal involvement, and distant metastatic disease. Accurate initial staging is essential because treatment selection and prognosis vary significantly by stage, and curative intent therapies are reserved for individuals without unresectable locoregional or distant metastases (NCCN, 2026).

NSCLC most commonly metastasizes to the liver, adrenal glands, brain, and bone. Cross sectional imaging of the chest and upper abdomen is therefore a foundational component of initial staging, as thoracic and upper abdominal disease burden directly impacts operability and treatment planning. Pelvic metastases are uncommon in the absence of symptoms and are not routinely evaluated during initial staging (NCCN, 2026).

Central nervous system involvement may be present at diagnosis, particularly in individuals with stage II–IV disease, and is frequently asymptomatic. Brain imaging is therefore incorporated into staging algorithms to prevent under staging and ensure appropriate systemic and local therapies are selected (NCCN, 2026; NCI, 2024). Superior sulcus (Pancoast) tumors represent a distinct anatomic subset of NSCLC characterized by apical location and potential invasion of the chest wall, brachial plexus, and spine (NCCN, 2026).

Evidence Discussion

Contrast-enhanced CT of the chest with evaluation of the upper abdomen to the level of the adrenal glands is supported for initial staging of all individuals with NSCLC. This approach reliably identifies intrathoracic disease, liver metastases, and adrenal involvement, which are among the most common sites of distant spread. Routine pelvic imaging is not supported in asymptomatic individuals, as pelvic metastases are rare and inclusion increases radiation exposure without meaningful improvement in staging accuracy (NCCN, 2026; NCI, 2024).

FDG PET/CT is supported for comprehensive staging in NSCLC when not previously performed. PET/CT improves detection of occult nodal and distant metastatic disease compared with conventional imaging alone and frequently alters stage assignment and management decisions. Bone scan is reserved for situations in which PET/CT is unavailable, as PET/CT provides equivalent or superior assessment of osseous metastatic disease while reducing the need for multiple separate studies (NCCN, 2026).

Brain imaging is supported for individuals with stage IB–IV disease due to the documented prevalence of occult brain metastases. MRI of the brain without and with contrast demonstrates higher sensitivity than CT for detection of metastatic disease and is preferred whenever feasible. Although the prevalence of brain metastases is lower in stage IB disease, MRI may still be considered to avoid under-staging and

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inappropriate selection of curative-intent therapy in a small but clinically significant subset of individuals (NCCN, 2026; NCI, 2024).

For suspected superior sulcus tumors, MRI of the chest and cervical and thoracic spine is supported in addition to standard staging studies. MRI provides superior specificity compared with CT for assessing chest wall invasion, neural involvement, and vertebral extension, which are critical determinants of resectability and treatment approach. Use of MRI in this setting reduces the risk of understaging locally advanced disease and supports appropriate multimodality treatment planning (NCCN, 2026).

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Non-Small Cell Lung Cancer – Restaging/Recurrence (ONC-8.4)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I or II individuals with non-small cell lung cancer who undergo definitive local treatment with surgery, radiation, or radiosurgery	• Restaging imaging is not considered medically necessary. See: **Surveillance/ Follow-up (ONC-8.5)**
Measurable disease in individuals with non-small cell lung cancer, undergoing active treatment	ANY or ALL of the following every 2 cycles: • CT Chest with (CPT® 71260) **or** CT Chest without contrast (CPT® 71250) • CT Abdomen with contrast (CPT® 74160) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) for known pelvic disease or pelvic symptoms • MRI Brain without and with contrast (CPT® 70553) for measurable brain metastases being treated with systemic therapy
ANY of the following in individuals with non-small cell lung cancer: • After neoadjuvant treatment for evaluation of surgical resectability • Prior to starting adjuvant therapy • Inadequately resected disease	• CT Chest with (CPT® 71260) **or** CT Chest without contrast (CPT® 71250)

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Indication	Medically Necessary Imaging Study
Suspected recurrence in individuals with non-small cell lung cancer	ANY or ALL of the following: • CT Chest with (CPT® 71260) **or** CT Chest without contrast (CPT® 71250) • CT Abdomen with contrast (CPT® 74160) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) for known pelvic disease or pelvic symptoms
Newly identified lung nodule(s) in individuals with non-small cell lung cancer	• See: **Lung Metastases (ONC-31.1)** for new nodule evaluation
ANY of the following in individuals with non-small cell lung cancer: • Suspected/biopsy proven recurrence localized to the chest cavity • Inconclusive findings on conventional imaging • To differentiate tumor from radiation scar/fibrosis • Stage IV with oligometastatic disease on conventional imaging and individual is a candidate for aggressive surgical resection or other localized treatment of metastases with a curative intent	• PET/CT (CPT® 78815)
ANY of the following in individuals with non-small cell lung cancer: • Following a demonstrated adequate response to neoadjuvant therapy if intracranial disease will preclude surgery • Documented recurrence/progression • New or worsening neurological signs or symptoms	• MRI Brain without and with contrast (CPT® 70553)

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Background and Supporting Information

Non-small cell lung cancer (NSCLC) demonstrates variable patterns of response and recurrence depending on stage, histology, and treatment modality. Individuals treated with definitive local therapy for early stage disease have a lower risk of recurrence compared with those with locally advanced or metastatic disease, and this difference informs imaging strategies during and after treatment (NCCN, 2026).

Recurrence of NSCLC may be locoregional within the chest or present as distant metastatic disease. Common sites of recurrence include the lung parenchyma, mediastinal lymph nodes, liver, adrenal glands, brain, and bone. Imaging strategies therefore prioritize modalities capable of assessing these regions with high sensitivity while minimizing unnecessary radiation exposure (NCCN, 2026).

Evidence Discussion

In individuals with measurable NSCLC undergoing active systemic therapy, periodic imaging with CT of the chest and abdomen is supported to assess treatment response and detect progression. Imaging every two cycles balances the need for timely identification of non-responding disease with avoidance of excessive radiation exposure and false-positive findings. Pelvic imaging is reserved for individuals with known pelvic involvement or new pelvic symptoms, as routine pelvic imaging does not provide additional staging value in asymptomatic patients (NCCN, 2026).

MRI of the brain with and without contrast is supported for individuals with known brain metastases receiving systemic therapy, as well as for those with new or worsening neurologic symptoms or documented systemic progression. MRI offers superior sensitivity for detecting intracranial disease compared with CT and allows accurate assessment of treatment response or progression, which directly influences surgical candidacy and systemic therapy decisions (NCCN, 2026).

CT imaging of the chest is also supported following neoadjuvant therapy to evaluate surgical resectability and post-operatively to establish a new baseline prior to initiation of adjuvant therapy. This approach improves surgical planning and ensures that residual or progressive disease is identified before additional treatment is undertaken, reducing the risk of futile or unsafe interventions (NCCN, 2026).

PET/CT is not routinely required for all individuals with suspected recurrence but is considered medically necessary in specific scenarios where conventional imaging is inconclusive, recurrence appears confined to the chest, or differentiation between viable tumor and post-treatment fibrosis is required. PET/CT is also considered medically necessary in selected individuals with stage IV oligometastatic disease who are candidates for aggressive local therapy, as it improves detection of occult disease that would alter management and prevents inappropriate curative-intent interventions (NCCN, 2026).

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Non-Small Cell Lung Cancer – Surveillance/Follow-up (ONC-8.5)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I-II non-small cell lung cancer (treatment including surgery and/ or chemotherapy, but no radiation)	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) every 6 months for 3 years and then annually
Stage I-II non-small cell lung cancer treated with radiation therapy Stage III-IV (metastatic sites treated with definitive intent)	• CT Chest with contrast (CPT® 71260) **or** CT Chest without contrast (CPT® 71250) every 3-6 months for 3 years, every 6 months for 2 years and then annually
New lung nodule in individuals with non-small cell lung cancer	• See: **Lung Metastases (ONC-31.1)**

Background and Supporting Information

Following definitive treatment of non-small cell lung cancer (NSCLC), surveillance imaging is intended to detect disease recurrence and identify new primary lung cancers at a potentially curable stage. The risk of recurrence is highest during the first two to three years after treatment and varies by stage, treatment modality, and disease extent, which informs the recommended frequency and duration of follow up imaging (NCCN, 2026; Schneider et al., 2019).

Patterns of failure in NSCLC differ by stage. Individuals with early stage disease treated surgically or with chemotherapy alone have lower recurrence rates than those treated with radiation or those with locally advanced or metastatic disease treated with definitive intent. As a result, surveillance strategies are risk adapted, with more frequent imaging

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recommended for higher risk populations during the early post treatment period (NCCN, 2026).

Evidence Discussion

CT of the chest with or without contrast is supported for surveillance following definitive treatment of NSCLC due to its superior sensitivity compared with chest radiography for detecting recurrence and new primary lung cancers. For individuals with stage I–II disease treated without radiation, national guidelines support imaging every 6 months during the initial high-risk period and then annually thereafter. This approach detects the majority of clinically meaningful recurrences and second primaries while limiting cumulative radiation exposure (NCCN, 2026; Schneider et al., 2019).

Individuals treated with radiation therapy and those with stage III–IV disease who have undergone definitive treatment of metastatic sites have a higher risk of early relapse. More frequent chest CT surveillance during the first several years after treatment improves detection of recurrence in these higher-risk populations. Evidence demonstrates that increasing surveillance intensity beyond recommended intervals does not improve survival, supporting structured imaging schedules that balance benefit with potential harms (NCCN, 2026; Schneider et al., 2019).

Routine abdominal and pelvic imaging in asymptomatic individuals is not supported, as surveillance chest CT adequately evaluates the most common sites of recurrence and new primary disease. Additional imaging of the abdomen or pelvis increases radiation exposure and cost without demonstrated improvement in outcomes in the absence of symptoms or prior disease involvement (Schneider et al., 2019).

FDG-PET/CT is not recommended for routine surveillance due to high false-positive rates, increased radiation exposure, and the risk of unnecessary downstream procedures. Similarly, MRI of the brain is not routinely recommended for asymptomatic surveillance in NSCLC, as evidence does not demonstrate a survival or quality-of-life benefit from routine intracranial imaging in the absence of neurologic symptoms. Limiting surveillance to chest CT optimizes diagnostic yield while minimizing harm (NCCN, 2026; Schneider et al., 2019).

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Esophageal and GE Junction Cancer (ONC-9)

Guideline

Esophageal and GE Junction Cancer – General Considerations (ONC-9.0)
Esophageal and GE Junction Cancer – Suspected/Diagnosis (ONC-9.1)
Esophageal and GE Junction Cancer – Initial Work-up/Staging (ONC-9.2)
Esophageal and GE Junction Cancer – Restaging/Recurrence (ONC-9.3)
Esophageal and GE Junction Cancer – Surveillance/Follow-up (ONC-9.4)
References (ONC-9)

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Esophageal and GE Junction Cancer – General Considerations (ONC-9.0)

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Criteria

- Imaging for esophageal cancer is determined by cell type and in which third of the esophagus it occurs.
- Cancers of the gastroesophageal (GE) junction are treated as lower third cancers.

Background and Supporting Information

Esophageal cancer is broadly classified into two primary histologic subtypes: squamous cell carcinoma and adenocarcinoma. These subtypes differ in epidemiology, pathogenesis, and anatomic distribution within the esophagus. Squamous cell carcinoma arises from the native squamous epithelium and most commonly involves the proximal and middle portions of the esophagus, whereas adenocarcinoma arises from glandular epithelium and typically occurs in the distal esophagus, often in association with the GE junction (NCCN, 2026).

Tumor location within the esophagus is closely associated with histologic type and is an important determinant of clinical evaluation and management. Cancers of the upper and middle thirds are most frequently squamous cell carcinomas, while cancers of the distal third and GE junction are predominantly adenocarcinomas. The Siewert classification is commonly used to characterize tumors involving the GE junction and helps guide staging and treatment, with distal esophageal and true junctional tumors managed similarly (NCCN, 2026).

Risk factors also differ by histology and align with anatomic distribution. Squamous cell carcinoma is strongly associated with environmental exposures such as tobacco and alcohol use, as well as other risk factors including prior caustic injury and certain genetic syndromes. In contrast, adenocarcinoma is closely linked to gastroesophageal reflux disease (GERD), obesity, and Barrett's esophagus, a premalignant condition characterized by specialized intestinal metaplasia of the distal esophagus (NCCN, 2026).

Barrett's esophagus represents a key precursor lesion for adenocarcinoma and is associated with increased risk of malignant progression, particularly in individuals with chronic GERD and elevated body mass index. The presence of Barrett's epithelium and its progression through dysplasia to adenocarcinoma underlies the predominance

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of adenocarcinoma in the distal esophagus and GE junction, especially in Western populations (NCCN, 2026).

Health Equity Considerations

Esophageal and GE junction cancers demonstrate marked inequities across incidence, stage at diagnosis, and outcomes that reflect the influence of social determinants of health. Population-level data show persistent disparities by sex, race and ethnicity, and geography, with men experiencing substantially higher incidence and mortality rates and rural populations demonstrating worsening mortality trends over time compared with urban populations (Elnaggar et al., 2025). Racial and ethnic minority populations are more likely to be diagnosed with advanced-stage disease, contributing to poor survival despite overall modest improvements in mortality at the national level (Elnaggar et al., 2025; Tustumi et al., 2024). Early detection remains challenging, as most individuals with esophageal adenocarcinoma and GE junction adenocarcinoma present with locally advanced or metastatic disease, underscoring structural barriers to timely diagnostic evaluation and surveillance, particularly for individuals with limited access to specialty care (Agarwal et al., 2024).

After diagnosis, disparities persist in access to timely imaging, multimodality staging, and definitive treatment. Lower educational attainment and lack of private insurance are strongly associated with treatment delays, lower likelihood of surgical intervention, and worse overall survival, independent of tumor characteristics (Tustumi et al., 2024). Patients residing in rural or lower-resource settings face additional barriers related to geographic distance from high-volume centers and limited availability of advanced imaging needed for accurate staging and treatment planning (Elnaggar et a;/. 2025). Evidence suggests that when individuals have equitable access to comprehensive imaging, staging, and guideline-concordant therapy, outcomes improve regardless of socioeconomic status, reinforcing the importance of standardized, evidence-based imaging pathways (Agarwal et al., 2024; Tustumi et al., 2024).

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Esophageal and GE Junction Cancer – Suspected/Diagnosis (ONC-9.1)

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- See: **Dysphagia and Upper Digestive Tract Disorders (NECK-3.1)** in the Neck Imaging Guidelines for evaluation of suspected esophageal malignancy.

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Esophageal and GE Junction Cancer – Initial Work-up/Staging (ONC-9.2)

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Criteria

Indication	Medically Necessary Imaging Study
Biopsy proven esophageal or GE junction cancer	• CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) instead of CT Abdomen if there are pelvic signs or symptoms
In addition to the above, for any of the following in individuals with esophageal or GE junction cancer: • Upper 1/3 of esophagus • Neck mass	• CT Neck with contrast (CPT® 70491)
If no evidence of metastatic disease on conventional imaging in individuals with esophageal or GE junction cancer	• PET/CT (CPT® 78815)

Background and Supporting Information

Accurate initial staging of esophageal and gastroesophageal junction cancers is essential to determine resectability, identify metastatic disease, and guide treatment selection. The staging process incorporates cross sectional imaging, functional imaging, and endoscopic techniques to define tumor location, depth of invasion, nodal involvement, and distant spread using the TNM classification system (NCCN, 2026).

Tumor location within the esophagus influences patterns of lymphatic spread and guides additional imaging. Cancers involving the upper third of the esophagus have a higher likelihood of cervical nodal involvement, which may necessitate imaging of the neck for comprehensive staging. Accurate delineation of nodal disease across cervical, mediastinal, and abdominal regions is essential for selecting appropriate multimodality therapy (NCCN, 2026).

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Evidence Discussion

Cross-sectional imaging with contrast-enhanced CT of the chest and abdomen is a first-line modality for initial staging because it reliably defines the location of the primary tumor and its relationship to surrounding structures, which is critical for determining resectability and planning therapy. CT also identifies regional nodal disease and common sites of metastases, providing a comprehensive baseline assessment. Restricting pelvic imaging to individuals with pelvic signs or symptoms is supported by evidence demonstrating that routine pelvic evaluation has lower diagnostic yield and increases unnecessary radiation exposure without improving staging accuracy (NCCN, 2026).

Additional imaging of the neck is supported in individuals with tumors involving the upper third of the esophagus or with clinical concern for cervical disease, such as a neck mass. This recommendation reflects known patterns of lymphatic drainage, as proximal esophageal tumors frequently spread to cervical lymph nodes. Inclusion of neck imaging in these cases improves detection of clinically significant nodal disease and reduces the risk of understaging, which could otherwise lead to inappropriate treatment selection (NCCN, 2026).

FDG PET/CT is supported following conventional CT imaging when no evidence of metastatic disease is identified, as it provides superior sensitivity for detecting occult distant metastases. This has direct clinical benefit by preventing inappropriate curative-intent therapies in individuals with unrecognized metastatic disease and facilitating appropriate systemic or palliative treatment. However, PET/CT has limitations in local staging, including reduced accuracy for determining depth of tumor invasion and distinguishing between early T stages, as well as limited reliability in assessing locoregional nodal disease due to metabolic activity from the primary tumor (NCCN, 2026).

The sequential use of CT followed by PET/CT balances diagnostic yield with minimization of unnecessary imaging. CT provides essential anatomic detail for staging and treatment planning, while PET/CT refines detection of distant disease. This combined approach enhances staging accuracy, improves treatment selection, and reduces the risks associated with overtreatment or misclassification, while avoiding overuse of advanced imaging modalities when not clinically indicated (NCCN, 2026).

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Esophageal and GE Junction Cancer – Restaging/Recurrence (ONC-9.3)

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Criteria

Indication	Medically Necessary Imaging Study
• After completion of primary therapy (to include chemotherapy and/or chemoradiotherapy), prior to surgery in individuals with esophageal or GE junction cancer • After completion of chemoradiation therapy with definitive intent (i.e., no metastatic disease and no anticipated resection surgery) in individuals with esophageal or GE junction cancer	Any ONE of the following, not both: • PET/CT (CPT® 78815) no sooner than 5 weeks post completion of radiation therapy OR • CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) instead of CT Abdomen if there are pelvic signs or symptoms or known pelvic disease
Post-surgical resection in individuals with esophageal or GE junction cancer	• See: **Surveillance/Follow-up (ONC-9.4)**
Monitoring response to chemotherapy for stage IV/ metastatic esophageal or GE junction cancer	Every 2 cycles of treatment (~every 6-8 weeks): • CT Abdomen with contrast (CPT® 74160) • CT Chest with contrast (CPT® 71260)
• If conventional imaging is inconclusive in individuals with esophageal or GE junction cancer **or** • Salvage surgical candidate with recurrence and no metastatic disease documented by conventional imaging in individuals with esophageal or GE junction cancer	• PET/CT (CPT® 78815)

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Indication	Medically Necessary Imaging Study
For ANY of the following in individuals with esophageal or GE junction cancer: • Signs or symptoms of recurrence • Biopsy proven on follow-up endoscopy • Recurrence suggested by other imaging (i.e., chest x-ray or barium swallow)	• CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast
If previously involved or new signs or symptoms in individuals with esophageal or GE junction cancer	• CT Pelvis with contrast (CPT® 72193) and/or CT Neck with contrast (CPT® 70491)

Background and Supporting Information

Restaging in esophageal and gastroesophageal junction cancers is performed after completion of initial therapy to evaluate response, determine resectability, and identify persistent or progressive disease. Management strategies vary depending on whether treatment intent is curative or palliative, with restaging imaging playing a central role in guiding subsequent surgical, systemic, or palliative approaches (NCCN, 2026).

Evaluation for recurrence may be triggered by clinical symptoms, endoscopic findings, or abnormalities identified on prior imaging. The distribution of recurrence can include locoregional disease or distant metastases, and imaging strategies are tailored accordingly, including targeted evaluation of previously involved regions or areas corresponding to new symptoms (NCCN, 2026).

Evidence Discussion

After completion of primary chemoradiation and prior to surgery, imaging with either contrast-enhanced CT or FDG PET/CT is supported to evaluate treatment response and detect persistent or metastatic disease. PET/CT provides functional assessment and may identify metabolically active residual disease or occult metastases not visualized on CT; however, it is susceptible to false-positive findings due to post-radiation inflammation. Delaying PET/CT imaging until several weeks after completion of radiation reduces this limitation and improves specificity, supporting its selective use in this setting (NCCN, 2026).

CT of the chest and abdomen with contrast remains an appropriate alternative for restaging because it provides reliable anatomic assessment of residual tumor and

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metastatic spread. Limiting pelvic imaging to individuals with pelvic symptoms or known disease is supported by the low prevalence of isolated pelvic metastases and the goal of minimizing unnecessary radiation exposure and cost. This targeted approach maintains diagnostic accuracy while avoiding routine imaging of low-yield regions (NCCN, 2026).

For individuals with stage IV or metastatic disease undergoing systemic therapy, serial CT imaging at defined treatment intervals supports timely assessment of response and progression. This approach allows early identification of treatment failure and facilitates modification of systemic therapy, which is critical for optimizing outcomes. More frequent imaging has not demonstrated additional benefit and increases cumulative radiation exposure, supporting interval imaging aligned with treatment cycles (NCCN, 2026).

PET/CT is additionally supported when conventional imaging is inconclusive or when evaluating potential candidates for salvage surgery in the absence of documented metastatic disease. In this context, PET/CT improves detection of occult metastases and helps avoid non-beneficial surgical interventions. Conversely, CT imaging is supported for evaluation of suspected recurrence based on symptoms, endoscopy, or other imaging findings, with expansion to include additional regions such as the neck or pelvis only when clinically indicated. This risk-adapted strategy improves diagnostic accuracy while minimizing unnecessary imaging and downstream interventions (NCCN, 2026).

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Esophageal and GE Junction Cancer – Surveillance/Follow-up (ONC-9.4)

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Criteria

Indication	Medically Necessary Imaging Study
Stage 0-IA (Tis, T1a) esophageal or GE junction cancer	• No routine advanced imaging
Stage IB (T1b)-III esophageal or GE junction cancer	• CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast every 6 months for 2 years and then annually for 3 more years
Stage IV esophageal or GE junction cancer	• See: **General Guidelines (ONC-1.0)**

Background and Supporting Information

Surveillance following definitive treatment of esophageal and GE junction cancers is intended to detect recurrence, monitor treatment-related complications, and identify new symptoms requiring evaluation. Surveillance strategies vary by initial stage of disease and treatment modality, as recurrence risk and patterns differ significantly across disease stages (NCCN, 2026).

Evidence Discussion

For individuals with stage 0–IA (Tis, T1a) disease, routine advanced imaging is not supported because the risk of distant metastases is low after adequate endoscopic or curative treatment, and surveillance is primarily focused on endoscopic evaluation of the mucosa and residual Barrett's epithelium. Avoiding routine CT imaging in this population minimizes unnecessary radiation exposure and reduces the likelihood of incidental findings without compromising clinical outcomes (NCCN, 2026).

In contrast, individuals with stage IB–III disease have a substantially higher risk of recurrence due to deeper tumor invasion and increased likelihood of nodal involvement. Cross-sectional imaging with contrast-enhanced CT of the chest and abdomen at structured intervals is supported to detect recurrence during the period when risk is highest. Most recurrences occur within the first few years following treatment, supporting

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more frequent imaging early after therapy with a transition to less frequent imaging over time. This approach balances the benefit of early detection of clinically actionable recurrence against the harms of excessive imaging, including cumulative radiation exposure, cost, and false-positive findings. Interval CT imaging allows identification of resectable or treatable recurrence and facilitates timely initiation of systemic or local therapy, while avoiding unnecessary imaging in lower-risk populations (NCCN, 2026).

For individuals with stage IV disease, imaging is guided by treatment status and clinical need, with interval CT imaging used to monitor response to therapy or detect progression. This strategy supports appropriate adjustment of systemic therapy and avoids both under-imaging, which could delay recognition of progression, and over-imaging, which may not provide additional clinical benefit in stable or asymptomatic individuals (NCCN, 2026).

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Other Thoracic Tumors (ONC-10)

Guideline

Malignant Pleural Mesothelioma – Suspected/Diagnosis (ONC-10.1)
Malignant Pleural Mesothelioma – Initial Work-up/Staging (ONC-10.2)
Malignant Pleural Mesothelioma – Restaging/Recurrence (ONC-10.3)
Malignant Pleural Mesothelioma – Surveillance/Follow-up (ONC-10.4)
Thymoma and Thymic Carcinoma – Suspected/Diagnosis (ONC-10.5)
Thymoma and Thymic Carcinoma – Initial Work-up/Staging (ONC-10.6)
Thymoma and Thymic Carcinoma – Restaging/Recurrence (ONC-10.7)
Thymoma and Thymic Carcinoma – Surveillance/Follow-up (ONC-10.8)
References (ONC-10)

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Malignant Pleural Mesothelioma – Suspected/Diagnosis (ONC-10.1)

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- See: **Asbestos Exposure (CH-9.1)** in the Chest Imaging Guidelines for evaluation of suspected mesothelioma.

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Malignant Pleural Mesothelioma – Initial Work-up/Staging (ONC-10.2)

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Criteria

- Signs and symptoms of metastatic disease in body areas not addressed in ONC-10 may be imaged according to their respective sections in ONC-31.

Indication	Medically Necessary Imaging Study
Cytologically or pathologically proven malignant pleural mesothelioma	• CT Chest (CPT® 71260) **and** CT Abdomen (CPT® 74160) with contrast ◦ CT Abdomen and Pelvis with contrast (CPT® 74177)instead of CT Abdomen if there are pelvic signs or symptoms or prior pelvic involvement
For EITHER of the following in individuals with malignant pleural mesothelioma: • No evidence of distant metastatic disease on CT imaging • Inconclusive conventional imaging	• PET/CT (CPT® 78815)
Suspicion of possible chest wall, spinal, diaphragmatic, or vascular involvement based on CT imaging in individuals with malignant pleural mesothelioma	• MRI Chest without and with contrast (CPT® 71552)

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Background and Supporting Information

Malignant pleural mesothelioma is an aggressive malignancy arising from mesothelial cells of the pleura and is associated with a poor prognosis, with most patients presenting with advanced disease at diagnosis. Accurate staging is critical for determining treatment options, including surgical resectability and the need for systemic therapy, and is typically performed using a combination of cross sectional and functional imaging modalities (Bou Samra et al., 2023; NCCN, 2026).

Evidence Discussion

Contrast-enhanced CT of the chest and abdomen is the foundation of initial staging because it provides reliable assessment of both intrathoracic disease and common extrathoracic metastatic sites, particularly the liver. CT offers superior evaluation of lung parenchyma and nodal disease compared with other modalities and is essential for determining disease extent and guiding treatment planning. The routine inclusion of abdominal imaging is supported by the frequency of hepatic metastases, whereas limiting pelvic imaging to patients with specific clinical indications reduces unnecessary radiation exposure without compromising diagnostic yield (NCCN, 2026).

MRI of the chest is supported when there is suspicion of invasion into adjacent structures, such as the chest wall, diaphragm, spine, or major vessels. Although MRI is less effective than CT for evaluating lung parenchyma, it provides improved soft tissue contrast and can better delineate local tumor extension in complex anatomic regions. This targeted use of MRI enhances staging accuracy in selected patients while avoiding routine use in all cases (NCCN, 2026).

FDG PET/CT is not recommended as a first-line imaging modality due to limitations in distinguishing malignant disease from benign inflammatory or asbestos-related changes, which may demonstrate variable FDG uptake. Additionally, PET/CT may underestimate local tumor extent and is therefore insufficient as a standalone staging tool. However, PET/CT provides important incremental value in detecting occult metastatic disease and is particularly useful when conventional imaging is negative or inconclusive (NCCN, 2026).

The use of PET/CT following conventional imaging is further supported by evidence demonstrating that a significant proportion of patients initially considered candidates for surgical resection may be reclassified as having unresectable disease after detection of previously unrecognized metastases. This approach improves patient selection for surgery, avoids non-beneficial invasive procedures, and ensures appropriate allocation to systemic or palliative therapies, thereby optimizing overall clinical management (NCCN, 2026).

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Health Equity Considerations

Malignant pleural mesothelioma (MPM) is a rare and aggressive malignancy with outcomes that are strongly influenced by nonclinical factors across the care continuum. Disease burden and survival vary by age, sex, race, and socioeconomic status, reflecting long-standing inequities related to historical asbestos exposure, access to specialty care, and delays in diagnosis. Older age and male sex are consistently associated with worse survival, while younger age and female sex are associated with more favorable outcomes, even after adjustment for stage and treatment (Freudenberger & Shah, 2021; Alnajar et al., 2023). Racial disparities are also evident: Black individuals experience significantly higher mortality and are more likely to be diagnosed at later stages, which may reflect differences in timely access to diagnostic imaging, specialty referral, and comprehensive staging evaluations (Freudenberger & Shah, 2021; Alnajar et al., 2023).

Inequities persist after diagnosis, particularly in access to advanced imaging, multimodality treatment, and high-volume academic centers. Individuals with lower income, lower educational attainment, Medicaid insurance, or no insurance are less likely to receive guideline-concordant care, including definitive surgical intervention and coordinated multimodality therapy, which are associated with improved survival in operable MPM (Freudenberger & Shah, 2021; Alnajar et al., 2023). Geographic barriers further compound these disparities; treatment at nonacademic or low-resource centers and limited ability to travel to specialized facilities are associated with worse outcomes, whereas receipt of care at high-volume academic centers even when requiring longer travel distances is linked to improved survival (Alnajar et al., 2023). Standardized, evidence-based imaging guidelines for MPM can help mitigate these inequities by supporting timely diagnosis, accurate staging, and consistent treatment assessment, thereby promoting more equitable access to high-quality care across diverse populations.

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Malignant Pleural Mesothelioma – Restaging/Recurrence (ONC-10.3)

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Criteria

Indication	Medically Necessary Imaging Study
Signs or symptoms of recurrence in individuals with malignant pleural mesothelioma	• CT Chest (CPT® 71260) **and** CT Abdomen (CPT® 74160) with contrast ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) instead of CT Abdomen if there are pelvic signs or symptoms or prior pelvic involvement
Treatment with chemotherapy in individuals with malignant pleural mesothelioma	Every 2 cycles: • CT Chest (CPT® 71260) **and** CT Abdomen (CPT® 74160) with contrast ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) instead of CT Abdomen if there are pelvic signs or symptoms or prior pelvic involvement
Following induction chemotherapy prior to surgical resection in individuals with malignant pleural mesothelioma	• CT Chest (CPT® 71260) **and** CT Abdomen (CPT® 74160) with contrast ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) instead of CT Abdomen if there are pelvic signs or symptoms or prior pelvic involvement • PET/CT (CPT® 78815) if no evidence of distant metastatic disease
Inconclusive CT Chest in individuals with malignant pleural mesothelioma	• MRI Chest without and with contrast (CPT® 71552)

Evidence Discussion

Contrast-enhanced CT of the chest and abdomen is the primary imaging modality for monitoring malignant pleural mesothelioma (MPM), as it enables consistent evaluation of pleural tumor burden, locoregional extension, and intra-abdominal spread. CT is

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recommended for both staging and follow-up because it reliably demonstrates pleural thickening, effusion, and patterns of progression, which are essential for identifying recurrence or treatment failure (Popat et al., 2022; Tsao et al., 2022). The use of CT chest and abdomen in individuals with signs or symptoms of recurrence is therefore supported by its ability to detect both thoracic and upper abdominal disease, allowing accurate identification of relapse and guiding appropriate changes in management (Popat et al., 2022).

Serial CT imaging during chemotherapy is supported by the need for standardized and reproducible response assessment in MPM. Due to the diffuse, rind-like growth pattern of mesothelioma, conventional tumor response metrics are inadequate, and modified RECIST (mRECIST) criteria were developed specifically for CT-based measurements of pleural thickness. These criteria allow categorization of response and progression, providing objective evidence to guide ongoing therapy (Tsao et al., 2022). Imaging every 2 cycles enables timely detection of disease progression or response, minimizing exposure to ineffective therapies while optimizing treatment selection. Although repeated CT imaging results in cumulative radiation exposure, this risk is outweighed by the clinical benefit of accurate disease monitoring in a malignancy with limited therapeutic windows (Popat et al., 2022; Tsao et al., 2022).

For individuals undergoing induction chemotherapy prior to possible surgical resection, CT imaging at completion of therapy is essential for reassessment of disease extent and operability. CT provides critical anatomic detail regarding tumor distribution and invasion, which directly impacts surgical candidacy (Popat et al., 2022; Tsao et al., 2022). In addition, PET/CT has an established complementary role in identifying occult extrathoracic metastatic disease, which may not be apparent on CT alone. Evidence demonstrates that a subset of patients considered for surgery are upstaged based on PET/CT findings, helping to avoid non-beneficial invasive procedures and redirect treatment toward systemic or radiation-based approaches (Tsao et al., 2022). While PET/CT introduces additional radiation exposure and potential false positives from inflammatory uptake, its selective use in this context improves staging accuracy and clinical decision-making.

MRI of the chest is an important adjunct when CT findings are inconclusive. MRI provides superior soft tissue contrast and may better delineate chest wall, diaphragmatic, and mediastinal invasion compared with CT, which is particularly relevant when distinguishing persistent tumor from treatment-related changes. This distinction is critical because post-treatment fibrosis and tumor can demonstrate overlapping features on other modalities (Tsao et al., 2022). Although MRI is not routinely required, its use when CT is nondiagnostic enhances diagnostic certainty and helps avoid both under- and overtreatment. Overall, the imaging strategy outlined in the clinical criteria balances the benefits of accurate disease assessment and treatment planning against the potential harms of radiation exposure, contrast risks, and imaging-related uncertainty, supporting its clinical utility in restaging MPM.

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Malignant Pleural Mesothelioma – Surveillance/Follow-up (ONC-10.4)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with malignant pleural mesothelioma	• CT Chest with contrast (CPT® 71260) and previously involved regions every 3 months for 2 years, then annually thereafter

Evidence Discussion

Contrast-enhanced CT of the chest, including previously involved regions, is the standard imaging modality for surveillance in malignant pleural mesothelioma (MPM) due to its established role in detecting locoregional recurrence and monitoring disease progression. CT provides consistent visualization of pleural tumor burden, chest wall involvement, and spread to adjacent and intra-abdominal structures, which are common patterns of disease relapse (Popat et al., 2022). Although formal consensus intervals are not uniformly defined, The European Society of Medical Oncology supports CT-based surveillance following treatment, recognizing its utility in identifying recurrent disease and guiding further management (Popat et al., 2022).

The recommendation for surveillance imaging every 3 months for the first 2 years reflects the natural history and prognosis of MPM, which is characterized by high rates of early recurrence and limited long-term survival. Median survival remains less than 2 years for many patients, particularly those with unresectable disease, indicating that the highest risk period for recurrence occurs early in the disease course (Popat et al., 2022). Close interval CT imaging during this period enables earlier detection of recurrence, allowing timely initiation of additional therapy or transition to palliative care when appropriate. After 2 years, the transition to less frequent (annual) imaging reflects the declining probability of recurrence over time.

Surveillance CT also provides objective assessment of disease status using reproducible imaging findings that correlate with clinical progression. Because MPM often spreads along pleural surfaces and into adjacent compartments, CT evaluation of both the chest and previously involved regions is critical to ensure comprehensive surveillance. This approach is supported by the known patterns of disease extension and the limitations of clinical evaluation alone in detecting early recurrence (Popat et al.,

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2022). While imaging beyond the chest may be individualized based on prior disease distribution, CT remains the foundational modality for longitudinal disease monitoring.

Potential harms of surveillance imaging include cumulative radiation exposure, risks associated with intravenous contrast, and the possibility of detecting clinically insignificant findings that may lead to additional testing. However, these risks are outweighed by the clinical benefit of early identification of recurrence in a disease with aggressive behavior and limited therapeutic windows. Regular CT surveillance allows clinicians to identify disease relapse before the onset of significant symptoms, optimize the timing of systemic or local therapies, and support informed prognostic discussions, thereby aligning imaging practices with the overall goals of care in MPM (Popat et al., 2022).

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Thymoma and Thymic Carcinoma – Suspected/Diagnosis (ONC-10.5)

ON.OT.0010.5.A
v1.0.2027

Criteria

- The proceeding guidelines are intended to be used for imaging of malignant mediastinal masses.
- See: **Mediastinal Mass (CH-20.1)** in the Chest Imaging Guidelines for evaluation of mediastinal mass without confirmation of malignancy.
- See: **Bronchopulmonary or Thymic Carcinoid – Initial Staging (ONC-15.6)** for imaging guidelines for thymic carcinoid.

Health Equity Considerations

Thymoma and thymic carcinoma are rare thoracic malignancies for which outcomes are influenced by geographic and sociodemographic factors that affect access to timely diagnosis and specialized care. Population-based analyses demonstrate clinically meaningful rural–urban disparities, with individuals residing in rural areas experiencing worse disease-specific survival compared with urban counterparts, even after adjustment for age, sex, race/ethnicity, histology, and stage at diagnosis (Cascone et al., 2024). Rural individuals are also more likely to have lower household income and reduced access to routine preventive and primary care services, which may delay incidental detection of these often asymptomatic tumors and limit timely referral for advanced imaging and multidisciplinary evaluation (Cascone et al., 2024). Given the insidious presentation of many thymic tumors, inequities in access to imaging and specialty consultation can disproportionately affect individuals in resource-limited or geographically isolated settings.

Emerging genomic data further highlight the importance of equitable representation and access to advanced diagnostics in thymic carcinoma. Large-scale molecular analyses reveal sex-associated and race-associated mutational patterns, including preliminary signals of distinct genomic alterations in underrepresented populations, such as Pacific Islander individuals, though conclusions are limited by small sample sizes (Chudziak et al., 2026). Incomplete demographic annotation and underrepresentation of minority groups in genomic databases underscore structural barriers to participation in precision oncology research and molecular profiling (Chudziak et al., 2026). Because comprehensive imaging and genomic characterization increasingly inform staging, recurrence assessment, and therapeutic decision-making in thymic malignancies, standardized imaging guidelines play a critical role in promoting equitable care.

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Consistent application of evidence-based imaging pathways can help reduce disparities related to geography, referral patterns, and access to specialized centers, supporting accurate diagnosis and management for diverse populations with thymoma and thymic carcinoma.

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Thymoma and Thymic Carcinoma – Initial Work-up/Staging (ONC-10.6)

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Criteria

Indication	Medically Necessary Imaging Study
Encapsulated or invasive limited thymoma or thymic carcinoma	• CT Chest with contrast (CPT® 71260)
Extensive mediastinal involvement on CT Chest in individuals with thymoma or thymic carcinoma	• CT Abdomen with contrast (CPT® 74160) • CT Neck with contrast (CPT® 70491)
Inconclusive finding on CT in individuals with thymoma or thymic carcinoma	ONE of the following: • PET/CT (CPT® 78815) • MRI Chest without and with contrast (CPT® 71552)
Preoperative planning in individuals with thymoma or thymic carcinoma	• MRI Chest without and with contrast (CPT® 71552)
Thymic Carcinomas	• Image according to **Non-Small Cell Lung Cancer - Initial Work-up/Staging (ONC-8.3)**

Evidence Discussion

Contrast-enhanced CT of the chest is the primary imaging modality for the initial work-up of thymoma and thymic carcinoma because it provides detailed anatomic characterization of anterior mediastinal masses and is essential for diagnosing, staging, and assessing resectability. CT typically demonstrates a well-defined round or oval mass in the thymic bed without associated lymphadenopathy in thymoma, allowing differentiation from other mediastinal pathologies and guiding further management (NCCN, 2025). The high spatial resolution of CT enables evaluation of tumor size, invasion into adjacent mediastinal structures, and features suggestive of malignancy, supporting its use for both encapsulated and invasive limited disease.

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When extensive mediastinal involvement is identified on CT chest, additional cross-sectional imaging of the neck and abdomen improves staging accuracy by evaluating for regional lymph node involvement and extrathoracic disease. Thymic carcinomas, in particular, demonstrate a higher propensity for lymphatic and distant metastases compared to thymomas, which more commonly remain localized (NCCN, 2025). PET/CT complements CT by identifying metabolically active nodal disease or distant metastases and has shown utility in assessing lymph node involvement and extrathoracic spread, although its role is adjunctive rather than primary in initial staging (Lococo et al., 2021). The combination of anatomic and metabolic imaging improves staging completeness and reduces the risk of understaging.

For indeterminate CT findings, PET/CT or MRI provides additional diagnostic clarification. PET/CT offers functional characterization, with higher FDG uptake correlating with more aggressive histology, higher tumor grade, and more advanced stage, thereby supporting risk stratification (Ito et al., 2021; Lococo et al., 2021). MRI offers superior soft tissue contrast and is particularly useful for distinguishing thymic tumors from cystic lesions or thymic hyperplasia, as well as evaluating invasion into adjacent structures such as the pericardium, vessels, and chest wall (NCCN, 2025). However, PET/CT may produce false-positive results due to physiologic or inflammatory uptake, and MRI can be limited by artifact or overlap in imaging characteristics, necessitating integration with CT findings.

MRI is also critical for preoperative planning because accurate assessment of local invasion directly impacts surgical approach and resectability. Complete surgical resection is the primary determinant of prognosis in thymic epithelial tumors, and imaging must accurately delineate tumor extension into adjacent structures to guide operative strategy (NCCN, 2025). While advanced imaging increases diagnostic accuracy, potential harms include increased cost, limited availability, contrast-related risks, and false-positive findings. Despite these limitations, the combined use of CT, PET/CT, and MRI provides complementary anatomic and functional information that supports accurate staging, optimal treatment planning, and avoidance of unnecessary or non-beneficial interventions.

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Thymoma and Thymic Carcinoma – Restaging/Recurrence (ONC-10.7)

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Criteria

Indication	Medically Necessary Imaging Study
Adjuvant therapy following surgical resection in individuals with thymoma or thymic carcinoma	• Follow surveillance imaging
Following induction chemotherapy prior to surgical resection, if no evidence of metastatic disease in individuals with thymoma or thymic carcinoma	ONE of the following: • PET/CT (CPT® 78815) • CT Chest with contrast (CPT® 71260) • MRI Chest without and with contrast (CPT® 71552)
For suspected recurrence in individuals with thymoma or thymic carcinoma	• CT Chest with contrast (CPT® 71260)
Recurrence with extensive mediastinal involvement on CT Chest in individuals with thymoma or thymic carcinoma	• CT Abdomen with contrast (CPT® 74160) • CT Neck with contrast (CPT® 70491)
Inconclusive finding on CT in individuals with thymoma or thymic carcinoma	ONE of the following: • PET/CT (CPT® 78815) • MRI Chest without and with contrast (CPT® 71552)

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Indication	Medically Necessary Imaging Study
Metastatic disease on chemotherapy in individuals with thymoma or thymic carcinoma	• CT Neck (CPT® 70491), CT Chest (CPT® 71260), and CT Abdomen (CPT® 74160) with contrast, every 2 cycles of therapy
Thymic carcinomas	• See: **Non-Small Cell Lung Cancer Restaging/ Recurrence (ONC-8.4)**

Evidence Discussion

In the setting of restaging following induction chemotherapy prior to surgical resection, imaging plays a critical role in determining treatment response and resectability. Functional imaging with PET/CT has demonstrated correlation between metabolic response and pathologic response in thymic epithelial tumors, supporting its use to confirm absence of metastatic disease and to guide surgical decision-making (NCCN, 2025). Cross-sectional imaging with contrast-enhanced CT or MRI of the chest also provides detailed anatomic evaluation of tumor burden and invasion into adjacent mediastinal structures, both of which are essential for assessing operability and planning resection. The availability of multiple imaging options allows tailoring based on clinical context, balancing diagnostic accuracy with patient-specific considerations such as contraindications to contrast or radiation exposure.

For suspected recurrence, contrast-enhanced CT of the chest is the primary imaging modality because recurrence of thymoma and thymic carcinoma most commonly occurs within the thorax, including pleural or mediastinal sites. Recurrent disease is often locoregional rather than distant, making CT particularly effective for detecting changes in tumor size, new pleural implants, or mediastinal progression (NCCN, 2025). When extensive mediastinal involvement is identified, additional CT imaging of the neck and abdomen is appropriate to evaluate for lymphatic and extrathoracic spread, which is more common in thymic carcinoma and has implications for staging and treatment selection. This approach ensures comprehensive evaluation of disease extent while avoiding unnecessary imaging in cases limited to the chest.

When CT findings are inconclusive, PET/CT or MRI provides complementary information that improves diagnostic confidence. PET/CT can identify metabolically active disease and may detect sites of recurrence not apparent on CT, whereas MRI provides superior soft tissue contrast and is particularly useful in distinguishing recurrent tumor from postoperative or treatment-related changes in the mediastinum (NCCN, 2025). However, PET/CT may be limited by false-positive uptake due to inflammation, and MRI may be affected by overlapping imaging characteristics, highlighting the importance of selective use in cases where CT is non-diagnostic. These adjunct

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modalities improve diagnostic accuracy while minimizing unnecessary additional imaging.

For individuals with metastatic disease undergoing chemotherapy, serial CT imaging of the neck, chest, and abdomen every 2 cycles provides objective assessment of treatment response and detects progression in both thoracic and extrathoracic sites. This approach is supported by the known patterns of spread and the need for timely reassessment in aggressive disease, particularly thymic carcinoma, which frequently presents with advanced or metastatic involvement (NCCN, 2025). Although repeated imaging introduces cumulative radiation exposure and contrast-related risks, these are outweighed by the clinical benefit of accurately monitoring response, guiding continuation or modification of therapy, and avoiding ineffective treatment in a population with variable disease behavior and prognosis.

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Thymoma and Thymic Carcinoma – Surveillance/Follow-up (ONC-10.8)

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Criteria

Indication	Medically Necessary Imaging Study
Thymoma, R0 resection	• CT Chest with contrast (CPT® 71260) and previously involved regions every 6 months for 2 years, then annually until year 10
Thymoma, R1 or R2 resection	• CT Chest with contrast (CPT® 71260) and previously involved regions every 6 months for 2 years, then annually until year 10
Thymic carcinoma, R0 resection	• CT Chest with contrast (CPT® 71260) every 6 months for 2 years and then annually until year 5
Thymic carcinoma, R1 or R2 resection	• CT Chest with contrast (CPT® 71260) and previously involved regions every 3 months for 2 years, then annually until year 5

Evidence Discussion

Surveillance imaging for thymoma following surgical resection is based on the known natural history of the disease, including the potential for late recurrence even after complete (R0) resection. Thymomas are generally indolent tumors, but recurrence can occur many years after initial treatment, with documented cases of recurrence more than 10 years post-resection (NCCN, 2025). As a result, long-term imaging surveillance with contrast-enhanced CT of the chest is supported, and inclusion of previously involved regions ensures comprehensive evaluation of common recurrence sites such as the pleura and mediastinum. The interval of every 6 months for the first 2 years reflects the higher risk of recurrence during this period, with transition to annual imaging thereafter aligning with the slower growth kinetics of relapsed thymoma.

For individuals with incomplete resection (R1 or R2) thymoma, continued surveillance with the same frequency and duration is appropriate given the increased risk of recurrence compared to completely resected disease. Residual microscopic or macroscopic disease increases the likelihood of both early and late recurrence, supporting consistent imaging intervals to facilitate timely detection and intervention

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(NCCN, 2025). Despite these risks, CT remains the preferred modality due to its ability to reliably detect subtle changes in pleural or mediastinal disease over time, which are often not clinically apparent.

Surveillance strategies for thymic carcinoma differ due to its more aggressive biology and higher likelihood of early recurrence and distant metastases. Thymic carcinoma demonstrates higher recurrence rates and more rapid progression compared to thymoma, with shorter median time to recurrence reported in clinical series (NCCN, 2025). For patients with R0 resection, CT chest every 6 months for 2 years followed by annual imaging through year 5 reflects the period of highest recurrence risk. In patients with residual disease (R1 or R2 resection), more frequent imaging every 3 months during the first 2 years is supported by the increased likelihood of early disease progression, allowing for prompt identification of recurrence and adjustment of therapy.

The primary benefit of this surveillance approach is early detection of recurrence, which may allow for potentially curative or disease-controlling interventions such as repeat resection, radiation therapy, or systemic therapy. However, potential harms include cumulative radiation exposure, contrast-related risks, and the possibility of incidental findings leading to additional testing. Despite these limitations, the balance of evidence supports regular CT surveillance given the clinical importance of early recurrence detection in both thymoma and thymic carcinoma, particularly in the context of variable disease behavior and the potential for long-term survival following appropriate intervention (NCCN, 2025).

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Breast Cancer (ONC-11)

Guideline

Breast Cancer – General Considerations (ONC-11.0)
Breast Cancer – Suspected/Diagnosis (ONC-11.1)
Breast Cancer – Initial Work-up/Staging (ONC-11.2)
Breast Cancer – Restaging/Recurrence (ONC-11.3)
Breast Cancer – Surveillance/Follow-up (ONC-11.4)
References (ONC-11)

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Breast Cancer – General Considerations (ONC-11.0)

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Criteria

- This guideline applies to invasive carcinoma and ductal carcinoma in situ histologies of breast cancer.
- Advanced imaging to evaluate for distant metastases is not medically necessary for asymptomatic individuals with invasive carcinoma or ductal carcinoma in situ (DCIS).
- High-risk lesions, such as LCIS, ADH, and ALH are discussed in **Breast MRI Indications (BR-5.1)**.
- Bone scan has a high concordance rate with PET for detecting bone metastases.
- Scintimammography and Breast Specific Gamma Imaging (BSGI) are considered experimental, investigational, or unproven.
- For malignant phyllodes tumors of the breast, see **Sarcomas - Bone, Soft Tissue, and GIST (ONC-12)**

Evidence Discussion

Advanced imaging to evaluate for distant metastases is not supported in asymptomatic individuals with invasive breast cancer or ductal carcinoma in situ (DCIS), as evidence demonstrates low diagnostic yield in early-stage disease and no improvement in clinical outcomes. NCCN guidelines consistently emphasize that advanced staging studies, including PET/CT, CT, and bone scan, should not be routinely performed in asymptomatic individuals without clinical or laboratory findings suggestive of metastatic disease, as this approach reduces false-positive results, unnecessary biopsies, and downstream testing without impacting survival (NCCN, 2025; NCCN, 2026).

A symptom-driven imaging strategy provides clinical benefit by reserving advanced imaging for patients with higher pretest probability of metastatic disease, such as those with concerning symptoms, abnormal physical examination findings, or laboratory abnormalities. This targeted approach improves diagnostic accuracy and ensures appropriate use of imaging resources while minimizing harms associated with overuse, including radiation exposure, patient anxiety, and the potential for incidental findings that may lead to unnecessary interventions (NCCN, 2025).

Bone scintigraphy demonstrates a high concordance with PET imaging for detection of osseous metastases, supporting its use as an appropriate modality when there is clinical suspicion for bone involvement. However, similar to PET/CT, routine use of bone scans

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in asymptomatic individuals is not recommended due to low yield and risk of false-positive findings. Limiting imaging to clinically indicated scenarios preserves diagnostic value while avoiding overdiagnosis and overtreatment (NCCN, 2025).

Imaging modalities such as scintimammography and breast-specific gamma imaging are not supported due to insufficient evidence of clinical utility and lack of demonstrated improvement in outcomes compared to established imaging techniques. Avoiding these modalities reduces unnecessary cost and exposure to ionizing radiation without compromising diagnostic performance. Overall, the evidence supports a risk-adapted, symptom-based imaging strategy that prioritizes clinically meaningful detection of metastatic disease while minimizing unnecessary imaging and associated harms (NCCN, 2025; NCCN, 2026).

Health Equity Considerations

Breast cancer outcomes in the United States remain marked by persistent inequities across race, ethnicity, socioeconomic status, and geography, despite advances in screening, imaging, and treatment. Black women experience substantially higher mortality than non-Hispanic White women, including in early-stage, hormone receptor–positive disease treated with guideline-concordant therapy. Evidence from randomized trials and population-level modeling demonstrates worse recurrence and survival outcomes among Black women despite similar tumor genomics, recurrence scores, and use of systemic therapy, indicating that disparities are not fully explained by biology or treatment delivery alone (Albain et al., 2020; Wojcik et al., 2024). Structural and social determinants, including insurance coverage, neighborhood disadvantage, comorbidity burden, and reduced access to preventive care, exert a strong influence on stage at diagnosis and long-term outcomes, often outweighing the contribution of genetic ancestry itself (Iyer et al., 2023).

Disparities arise early in the care continuum and are closely linked to inequitable access to screening and diagnostic imaging. Racial and ethnic minoritized populations, individuals with lower income or education, uninsured or underinsured patients, and those living in rural or medically underserved areas consistently demonstrate lower screening utilization, delays in diagnostic follow-up, and reduced access to advanced imaging modalities such as digital breast tomosynthesis and supplemental ultrasound or MRI (Nayyar et al., 2023; Ozcan et al., 2023; Wilkerson et al., 2024). Geographic variation and health-system factors, including availability of multidisciplinary teams, specialty care resources, and navigation infrastructure, explain a substantial proportion of disparities in receipt of recommended therapies and survivorship outcomes (Hassett et al., 2025; Schneider et al., 2026). Standardized, evidence-based imaging guidelines are therefore essential to reducing inequities by supporting consistent screening, diagnostic evaluation, staging, and surveillance across care settings, while enabling equitable access to high-quality breast cancer care when integrated with patient navigation, community outreach, and attention to social risk factors (Bayard et al., 2022).

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Breast Cancer – Suspected/Diagnosis (ONC-11.1)

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- See: **Breast MRI Indications (BR-5.1)** in the Breast Imaging Guidelines for evaluation of suspected breast cancer.

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Breast Cancer – Initial Work-up/Staging (ONC-11.2)

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Criteria

Indication	Medically Necessary Imaging Study
Newly diagnosed breast cancer or ductal carcinoma in situ	• Diagnostic bilateral mammogram and/or Ultrasound Breast (CPT® 76641 or CPT® 76642) and/or Ultrasound Axilla (CPT® 76882) are imaging modalities of choice (See **Breast Ultrasound (BR-1.1))** • MRI Breast bilateral without and with contrast (CPT® 77049)
ANY of the following: • Atypical ductal hyperplasia (ADH) • Atypical lobular hyperplasia (ALH) • Lobular carcinoma in situ (LCIS)	See: **Breast MRI Indications (BR-5.1)**
ANY of the following: • Ductal carcinoma in situ • Stage I-III breast cancer	• For sentinel lymph node evaluation: Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
Stages I, II, and operable stage III (N1 disease) breast cancer	• Routine systemic imaging is not medically necessary for initial staging of non-metastatic breast cancer in the absence of signs or symptoms

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with breast cancer: • Diagnosis of breast cancer with suspected or proven metastatic disease or biopsy-proven distant metastases/ Stage IV disease (not locally advanced disease with three or less positive axillary nodes) • Signs or symptoms of systemic disease • Elevated liver function tests or tumor markers • Inflammatory breast cancer (stage T4d) • 4 or more axillary lymph nodes positive for cancer involvement (i.e., N2 disease, including Stage III N2)	ANY or ALL of the following: • CT Chest (CPT® 71260) **and** CT Abdomen and Pelvis (CPT® 74177) with contrast • Bone scan (CPT® 78306) (if PET/CT is not being performed) See: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes
ANY of the following in individuals with breast cancer: • Stage III N2 disease or higher • T4 disease • Inflammatory breast cancer (stage T4d)	In addition to the above: • FDG PET/CT (CPT® 78815 or 78816)
Inconclusive CT and/or bone scan in individuals with breast cancer	FDG PET/CT (CPT® 78815 or 78816)

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Indication	Medically Necessary Imaging Study
Bone pain in individuals with breast cancer	• Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)**) for additional bone scan codes • PET/CT (CPT® 78815 or 78816) with Sodium Fluoride radiotracer if CT, MRI, Bone scan and FDG PET/CT scan are inconclusive for bone metastases • See: **Bone (Non-Vertebral) Metastases (ONC-31.5)** • See: **Spinal/Vertebral Metastases (ONC-31.6)**

- ^{18}F-FES (fluoroestradiol) PET/CT scan is not considered medically necessary for initial staging.

Background and Supporting Information

Breast cancer staging encompasses evaluation of locoregional disease within the breast and regional lymph nodes, as well as assessment for distant metastatic disease. Tumor stage is determined by tumor size, nodal involvement, and presence of metastases, with early-stage disease (Stages I–II) generally confined to the breast and limited nodal regions, and advanced disease (Stage III–IV) reflecting more extensive nodal or distant spread (Expert Panel on Breast Imaging, 2024). Accurate initial staging is critical because management strategies and prognosis differ significantly across stages, and imaging plays a central role in defining the extent of disease prior to treatment planning.

Evidence Discussion

Diagnostic mammography and ultrasound are supported as primary imaging modalities for initial work-up because they provide reliable assessment of tumor presence, size, and locoregional extent with a favorable risk–benefit profile. These techniques are widely available, cost-effective, and avoid unnecessary downstream testing. Evidence-based guidelines emphasize their role as first-line imaging for staging, as they adequately define disease extent in most patients while minimizing harms associated with more advanced imaging (Expert Panel on Breast Imaging, 2024; NCCN, 2026).

Breast MRI provides higher sensitivity for detecting additional ipsilateral and contralateral malignancies and may improve delineation of tumor extent, particularly in dense breast tissue or invasive lobular carcinoma. MRI has demonstrated the ability to detect otherwise occult disease, including in cases with negative mammography, thereby potentially influencing surgical planning (Morrogh et al., 2007). However, multiple studies highlight that MRI is associated with increased false-positive findings,

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which can lead to additional imaging, biopsies, and more extensive surgery without consistent improvement in outcomes (Cozzi & Schiafno, 2023; Cheng et al., 2012). Furthermore, variability in diagnostic performance and limited evidence for survival benefit reinforce that MRI should be used selectively rather than routinely (Expert Panel on Breast Imaging, 2024; Peters et al., 2011; Kleer, 2000).

Sentinel lymph node evaluation is essential for staging; however, the incremental value of lymphoscintigraphy is limited. Although lymphoscintigraphy can identify alternative lymphatic drainage patterns, studies demonstrate that axillary sentinel lymph nodes are still identified in most patients regardless of mapping results, and axillary nodal positivity rates are not significantly influenced by drainage patterns (Chagpar et al., 2005). Given the limited impact on management and outcomes, routine use of lymphoscintigraphy adds cost and complexity without clear clinical benefit.

Systemic imaging with CT, bone scan, or PET/CT is most beneficial in patients with suspected metastatic disease or high-risk clinical features. In early-stage, asymptomatic patients, evidence demonstrates a low prevalence of distant metastases, and routine imaging leads to a high rate of false-positive findings, increased costs, additional procedures, and delays in care without improving survival (Jochelson et al., 2013; NCCN, 2026; Expert Panel on Breast Imaging, 2024). Functional imaging such as FDG-PET/CT offers whole-body assessment and relatively high sensitivity but has lower specificity, increasing the likelihood of false-positive results and unnecessary diagnostic workup (Cheng et al., 2012). Collectively, these data support a risk-adapted strategy in which systemic imaging is reserved for patients with clinical suspicion or advanced disease, consistent with guideline recommendations.

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Breast Cancer – Restaging/Recurrence (ONC-11.3)

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Criteria

- For imaging related to breast reconstruction, see: **Breast Reconstruction (BR-3.1)** in the Breast Imaging Guidelines

Indication	Medically Necessary Imaging Study
ANY of the following in individuals with breast cancer: • End of planned neoadjuvant chemotherapy to determine resectability • Biopsy proven local recurrence • Suspicion of recurrence with inconclusive mammogram and/or ultrasound (BIRADS 0) • Mammogram and/or ultrasound conflicts with physical exam	• MRI Breast Bilateral without and with contrast (CPT® 77049)
After neoadjuvant chemotherapy in individuals with breast cancer, if sentinel lymph node evaluation is planned	• Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
ANY of the following in individuals with breast cancer: • Assessing for residual disease after surgery • Assessing response to neoadjuvant chemotherapy • After lumpectomy or mastectomy, prior to adjuvant therapy	• Neither PET nor CT are medically necessary for systemic restaging after neoadjuvant chemotherapy or after surgery • If surgery upstages individual to Stage III N2 disease or higher and has not had prior staging, refer to **Breast Cancer – Initial Work-up/Staging (ONC-11.2)**

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Indication	Medically Necessary Imaging Study
• Treatment response in individuals with metastatic disease and measurable disease on imaging ◦ For individuals receiving chemotherapy, imaging is medically necessary after every 2 cycles ◦ For individuals receiving hormonal or endocrine therapy, imaging is medically necessary every 3 months	• CT Chest with contrast (CPT® 71260); and CT Abdomen and Pelvis with contrast (CPT® 74177) • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) In addition to the above options, for individuals receiving systemic treatment for brain metastases: • MRI Brain without and with contrast (CPT® 70553)
ANY of the following in individuals with breast cancer: • Elevated LFTs • Elevated tumor markers** (i.e., CA27/29, CA15-3, CEA, alkaline phosphatase) • Signs or symptoms of recurrence • Biopsy proven recurrence	Any or all of the following: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • Bone scan (CPT® 78306) (See also: **Nuclear Medicine (NM) Imaging in Oncology) (ONC-1.3)** for additional bone scan codes) For individuals with prior history of brain metastases or current signs or symptoms of brain metastases: • MRI Brain without and with contrast (CPT® 70553) **Elevated ctDNA alone in the absence of elevations of traditional tumor markers and/or clinical signs and symptoms does not warrant imaging

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Indication	Medically Necessary Imaging Study
• Inconclusive CT, MRI, and/or bone scan in individuals with breast cancer • Treatment response assessment for bone-only metastases (excluding brain metastases) and a prior bone scan has not been performed for serial comparison in individuals with breast cancer	• ^{18}F-FDG PET/CT (CPT® 78815 or 78816)
Individuals with breast cancer with known or suspected bone metastases AND inconclusive bone findings on ALL of the following: • CT, MRI, bone scan, and FDG PET/CT scan	• ^{18}F Sodium Fluoride PET/CT (CPT® 78815 or 78816)
To determine the ER-status of suspected/ known metastatic recurrence in individuals with breast cancer noted on CT/bone scan **and** any one of the following: • Biopsy of metastatic site is non-diagnostic/inconclusive • Biopsy of metastatic site is risky & cannot be performed (metastatic sites in the brain, spine or near vascular structures)	• ^{18}F-FES (fluoroestradiol) PET/CT scan (CPT® 78815 or CPT® 78816)

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Indication	Medically Necessary Imaging Study
Individuals with breast cancer treated with Enhertu® (fam-trastuzumab deruxtecan) in the adjuvant setting	• High-resolution CT Chest without contrast (CPT® 71250) ◦ Baseline if not already done within past 4 weeks ◦ Every 12 weeks while on Enhertu® therapy ▪ For patients receiving Enhertu® concurrent with radiation therapy, an additional scan is medically necessary at the end of radiation at approximately week 6 ◦ End of treatment with Enhertu® (5-7 weeks after last cycle) ◦ For suspected or known ILD, see **Interstitial Lung Disease (ILD)/ Diffuse Lung Disease (DLD) (CH-11.1)** ◦ HRCT (CPT® 71250) can be done per the above criteria if previous diagnostic CT Chest with contrast (CPT® 71260) was not adequate. HRCT is done with a thinner-slice protocol that can provide additional details to help determine ILD subtype.

Background and Supporting Information

Breast cancer recurrence includes local, regional, and distant metastatic disease, each with distinct patterns of presentation and clinical implications. Local recurrence typically occurs in the ipsilateral breast or chest wall, while regional recurrence involves lymph nodes, and distant recurrence reflects metastatic spread to organs such as bone, liver, lung, or brain. Risk of recurrence varies based on tumor biology, stage at diagnosis, and treatment received, with the greatest risk occurring within the first several years following primary therapy (NCCN, 2026).

Evidence Discussion

Breast MRI is supported as a problem-solving tool in restaging and recurrence, particularly when conventional imaging is inconclusive or discordant with clinical findings. Evidence demonstrates that MRI provides improved delineation of tumor

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extent and may more accurately estimate size of recurrent disease compared with mammography and ultrasound, particularly in settings such as ipsilateral breast tumor recurrence (Walstra et al., 2020). MRI also improves detection of multifocal disease and can identify additional occult lesions not seen on conventional imaging, which may influence surgical planning (Walstra et al., 2020; Hovis et al., 2021). However, these benefits must be balanced against limitations, including higher false-positive rates and potential for overtreatment or unnecessary biopsies, supporting its selective rather than routine use in recurrence evaluation (Walstra et al., 2020).

Following neoadjuvant chemotherapy, MRI provides the most accurate imaging estimate of residual disease compared with conventional modalities, although it may still overestimate or underestimate tumor size in some cases (Hovis et al., 2021). This supports its use in assessing treatment response and determining surgical resectability. However, the variability in accuracy and absence of consistent outcome benefit with routine use reinforce that imaging should be guided by clinical context rather than performed universally.

Systemic imaging with CT, bone scan, and MRI is primarily supported in individuals with suspected or confirmed metastatic disease. NCCN guidelines support the use of CT chest/abdomen/pelvis and bone scan for evaluation of recurrence when there are symptoms, abnormal laboratory findings, or biopsy-proven disease, as these modalities provide comprehensive assessment of common metastatic sites (NCCN, 2026). Serial imaging during systemic therapy allows for objective assessment of treatment response and progression, enabling timely modification of therapy. However, routine systemic imaging after surgery or neoadjuvant therapy in asymptomatic individuals is not recommended due to low yield and lack of demonstrated survival benefit (ASCO, 2021; NCCN, 2026). This principle extends to circulating tumor DNA (ctDNA). NCCN restricts ctDNA-based biomarker testing to recurrent resectable (local or regional) or stage IV disease for selection of targeted therapy, and does not endorse ctNDA as a trigger for surveillance imaging in earlier-stage or asymptomatic individuals (NCCN, 2026). Accordingly, elevated ctDNA alone, in the absence of elevations of traditional tumor markers and/or clinical signs and symptoms, does not warrant imaging (NCCN, 2026).

Advanced functional imaging with FDG-PET/CT provides whole-body metabolic assessment and may detect disease not seen on conventional imaging, but its routine use in restaging is limited by lack of standardized response criteria and potential for false-positive findings. NCCN recommends PET/CT primarily as a problem-solving tool when conventional imaging is equivocal or inconclusive (NCCN, 2026). Similarly, sodium fluoride PET/CT may be useful in detection of bone metastases when other imaging is nondiagnostic. Overall, the evidence supports a risk-adapted, symptom-driven imaging approach for restaging and recurrence that prioritizes diagnostic accuracy while minimizing unnecessary radiation exposure, cost, and downstream interventions.

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Breast Cancer – Surveillance/Follow-up (ONC-11.4)

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Criteria

Indication	Medically Necessary Imaging Study
Measurable metastatic disease in individuals with breast cancer on maintenance therapy or being monitored off therapy	ANY or ALL of the following, every 3 months for up to 5 years after completion of active treatment: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)
• Asymptomatic non-metastatic disease in individuals with breast cancer • Individuals receiving post-operative adjuvant therapy in individuals with breast cancer	• No advanced imaging
Individuals with a personal history of breast cancer (not treated with bilateral mastectomy)	• Annual MRI Breast Bilateral without and with contrast (CPT® 77049)

Background and Supporting Information

Breast cancer surveillance following primary treatment focuses on detection of locoregional recurrence, second primary breast cancers, and, in selected patients, monitoring for metastatic progression. Surveillance strategies vary based on initial stage, treatment modality, and individual risk factors, including genetic predisposition, breast density, and age at diagnosis (NCCN, 2026). Routine follow-up typically includes clinical evaluation and annual mammography, while additional imaging is guided by risk stratification and clinical findings.

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Evidence Discussion

Routine surveillance imaging in asymptomatic individuals with non-metastatic breast cancer is not supported by evidence demonstrating clinical benefit. NCCN-based recommendations consistently emphasize that intensive imaging, including CT, PET, or bone scans, does not improve survival or quality of life in this population and is associated with harms such as radiation exposure, false-positive findings, unnecessary biopsies, and increased cost (NCCN, 2026). These findings underpin the recommendation to avoid advanced imaging in asymptomatic individuals receiving adjuvant therapy or in routine follow-up.

Evidence from systematic reviews and meta-analyses further demonstrates the limited utility of imaging surveillance after mastectomy. Detection rates of clinically occult, nonpalpable recurrences are low across all imaging modalities, including MRI, mammography, and ultrasound, and fall below accepted performance benchmarks (Smith et al., 2022). Moreover, interval cancer rates are comparable to or exceed detection rates in some settings, indicating that routine imaging may not meaningfully improve early detection beyond clinical examination. These data support recommendations against routine imaging surveillance in individuals treated with mastectomy.

Breast MRI provides benefit in selected high-risk individuals by improving detection of early-stage and otherwise occult cancers, particularly in patients with dense breast tissue or elevated lifetime risk. MRI has been shown to detect cancers at earlier stages and reduce interval cancer rates in high-risk populations, but its use is associated with increased false-positive findings, additional testing, and potential overdiagnosis (Monticciolo et al., 2023; NCCN, 2026). These competing benefits and harms support restricting MRI surveillance to individuals with clearly defined high-risk features rather than routine use in all breast cancer survivors.

In individuals with measurable metastatic disease, serial imaging with CT and bone scan provides objective assessment of treatment response and progression, which is critical for guiding ongoing therapy. Evidence supports periodic imaging at defined intervals based on treatment type, as this approach enables timely modification of systemic therapy while balancing cumulative radiation exposure (Christin et al., 2019; NCCN, 2026). Overall, the evidence supports a risk-adapted surveillance strategy that limits imaging in asymptomatic non-metastatic patients, incorporates MRI selectively in high-risk populations, and utilizes structured imaging follow-up for patients with known metastatic disease.

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Sarcomas – Bone, Soft Tissue, and GIST (ONC-12)

Guideline

Bone and Soft Tissue Sarcomas – General Considerations (ONC-12.1)
Soft Tissue Sarcomas – Initial Work-up/Staging (ONC-12.2)
Soft Tissue Sarcomas – Restaging/Recurrence (ONC-12.3)
Soft Tissue Sarcomas - Surveillance/Follow-up (ONC-12.4)
Gastrointestinal Stromal Tumor (GIST) (ONC-12.5)
Bone Sarcomas – Initial Work-up/Staging (ONC-12.6)
Bone Sarcomas – Restaging/Recurrence (ONC-12.7)
Bone Sarcomas – Surveillance/Follow-up (ONC-12.8)
Benign Bone Tumors – General Considerations (ONC-12.9)
Benign Bone Tumors – Initial Work-up/Staging (ONC-12.10)
Benign Bone Tumors – Restaging/Recurrence (ONC-12.11)
Benign Bone Tumors – Surveillance/Follow-up (ONC-12.12)
References (ONC-12)

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Bone and Soft Tissue Sarcomas – General Considerations (ONC-12.1)

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Criteria

- Malignant nerve sheath tumor cell types should be imaged as high-grade sarcoma.
- Sarcomas occur in both adult and pediatric individuals, but some are more common in one age group than the other. Unless specified below, individuals 19 years of age or older should be imaged according to this guideline section.
- Exceptions include:
  - Rhabdomyosarcoma in individuals of all ages should be imaged according to guidelines in **Rhabdomyosarcoma (RMS) (PEDONC-8.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
  - Osteogenic sarcoma (Osteosarcoma) in individuals of all ages should be imaged according to guidelines in **Osteogenic Sarcoma (OS) (PEDONC-9.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
  - Ewing sarcoma and Primitive Neuroectodermal Tumor in individuals of all ages should be imaged according to guidelines in **Ewing Sarcoma and Primitive Neuroectodermal Tumors (ESFT) (PEDONC-9.4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
  - Kaposi's sarcoma in individuals of all ages should be imaged according to guidelines in **Kaposi's Sarcoma (ONC-31.10)**.
  - See: **Uterine Cancer (ONC-22)** for imaging recommendations for uterine sarcoma.
  - Desmoplastic small round cell tumor in individuals of all ages should be imaged according to guidelines in **Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS) (PEDONC-8.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Background and Supporting Information

Bone and soft tissue sarcomas are heterogeneous malignancies of mesenchymal origin that arise in a wide range of anatomic locations, including bone, muscle, fat, nerve sheath, and connective tissues. These tumors demonstrate variable biologic behavior, ranging from low-grade lesions with indolent growth to high-grade aggressive malignancies with metastatic potential. Accurate characterization of tumor grade, size, and anatomic relationships is essential for staging and treatment planning, as these factors significantly influence prognosis and management (NCCN, 2026).

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Evaluation and management of sarcomas require a multidisciplinary approach that includes radiology, surgery, medical oncology, radiation oncology, and pathology. Both NCCN bone and soft tissue sarcoma guidelines emphasize that patients should be treated in specialized centers with expertise in sarcoma care, as coordinated multidisciplinary planning improves diagnostic accuracy and optimizes treatment outcomes (NCCN, 2026).

Evidence Discussion

The choice of imaging modality for sarcoma evaluation is guided by tumor location and clinical scenario, with cross-sectional imaging providing the greatest diagnostic value. MRI is generally preferred for evaluation of the primary tumor because of its superior soft tissue contrast resolution, enabling accurate delineation of tumor extent, involvement of adjacent structures, and surgical planning. CT offers complementary value, particularly for osseous structures and anatomic regions such as the chest and retroperitoneum, where it provides detailed assessment of tumor size and involvement of visceral or vascular structures (NCCN, 2026). The use of these modalities improves staging accuracy and informs treatment decisions, though MRI availability, cost, and patient tolerance may limit universal use.

Cross-sectional imaging also supports accurate biopsy planning and reduces the risk of sampling error or complications. NCCN guidelines emphasize that imaging should be performed prior to biopsy and coordinated with the surgical team to optimize biopsy placement and avoid compromising future resection margins (NCCN, 2026). This approach minimizes adverse outcomes and enhances diagnostic yield but requires careful coordination and may increase upfront complexity of care.

Health Equity Considerations

Soft tissue sarcomas (STS) are rare, heterogeneous malignancies that require timely, coordinated, and highly specialized multidisciplinary care, yet access to such care is not equitable across populations. Diagnostic and treatment delays are common due to nonspecific early symptoms, limited exposure to sarcoma in primary care, and the relative scarcity of specialized sarcoma centers, which are often concentrated in academic or urban settings. These challenges disproportionately affect historically marginalized populations. Large, multi-institutional U.S. data demonstrate that racial and ethnic disparities exist in time to treatment for patients with soft tissue sarcomas, with Black individuals experiencing longer delays to surgical resection and radiation therapy compared with White individuals, particularly in non-emergent care settings (Romoff et al., 2026). Earlier surgical intervention observed among some Black and Hispanic individuals in metastatic or urgent contexts likely reflects more advanced disease at presentation rather than improved access, highlighting inequities upstream in early diagnosis, referral, and imaging-based evaluation (Romoff et al., 22026).

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At the population level, global analyses reveal substantial geographic and sociodemographic disparities in the burden of soft tissue and other extraosseous sarcomas. While high-income regions demonstrate higher incidence and prevalence, likely reflecting better access to diagnostic imaging and pathology, low and low-middle Socio-Demographic Index regions experience higher mortality and disability-adjusted life-year burdens, underscoring inequities in timely diagnosis and access to effective treatment (Zhu et al., 2025). Across regions, males and older adults bear a disproportionately higher disease burden, and resource-limited settings face challenges including inadequate imaging infrastructure, workforce shortages, and incomplete cancer surveillance systems (Zhu et al., 2025). Standardized oncology imaging guidelines play a critical role in promoting health equity by supporting early recognition, appropriate diagnostic workup, accurate staging, and treatment response assessment regardless of care setting. When applied consistently and integrated with improved referral pathways and access to sarcoma-experienced multidisciplinary teams, evidence-based imaging pathways may help reduce disparities in outcomes for individuals with soft tissue sarcomas.

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Soft Tissue Sarcomas – Initial Work-up/ Staging (ONC-12.2)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with biopsy-proven soft tissue sarcoma, regardless of histology	• CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast • MRI without and with contrast of involved area ◦ CT of involved area if contraindication to MRI
ANY of the following: • Angiosarcoma • Alveolar soft part sarcoma • Clear cell sarcoma • Epithelioid sarcoma • Hemangiopericytoma • Leiomyosarcoma • Liposarcoma • Retroperitoneal or intra-abdominal primary site (including pelvic primary site) • Other histologies documented to have propensity for lymphatic spread and deep-seated tumors	In addition to the above, one of the following combinations: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • MRI Abdomen (CPT® 74183) with and without contrast and CT Pelvis (CPT® 72193) with contrast • CT Abdomen (CPT® 74160) with contrast and MRI Pelvis (CPT® 72197) without and with contrast

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Indication	Medically Necessary Imaging Study
ANY of the following: • Myxoid round cell liposarcoma • Angiosarcoma • Alveolar soft part sarcoma • Cardiac sarcoma • Neurologic signs or symptoms raising suspicion of CNS metastases	In addition to the above: • MRI Brain without and with contrast (CPT® 70553) • MRI Cervical/Thoracic/Lumbar Spine without and with contrast (CPT® 72156, CPT® 72157, and CPT® 72158)
Leiomyosarcoma	In addition to the above: • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) Imaging in Oncology [ONC-1.3]** for additional bone scan codes)
ANY of the following in individuals with soft tissue sarcomas: • Grade of tumor in doubt following biopsy • Conventional imaging suggests solitary metastasis amenable to surgical resection • Inconclusive conventional imaging • Prior to planned neoadjuvant therapy	• PET/CT (CPT® 78815 or CPT® 78816)
Desmoid Tumors	ONE of the following: • CT without contrast or with contrast of the affected body part • MRI without contrast or without and with contrast of the affected body part • Imaging of lung, lymph node, and metastatic site for these tumors is not considered medically necessary
Myxoid/round cell liposarcoma	In addition to the above studies, whole-body MRI (CPT® 76498) is considered medically necessary for a baseline assessment

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Indication	Medically Necessary Imaging Study
Dermatofibrosarcoma Protuberans (DFSP)	ONE of the following: • CT without contrast or with contrast of the affected body part • MRI without contrast or without and with contrast of the affected body part • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast for: ◦ Pulmonary symptoms ◦ Abnormal chest x-ray ◦ Sarcomatous differentiation
Malignant phyllodes tumor of the breast (not benign or borderline)	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Breast bilateral without and with contrast (CPT® 77049)

Background and Supporting Information

Soft tissue sarcomas are a heterogeneous group of malignant tumors arising from mesenchymal tissues, including muscle, fat, fibrous tissue, and neurovascular structures. These tumors vary widely in biologic behavior, ranging from low-grade lesions with limited metastatic potential to high-grade tumors with aggressive local invasion and early dissemination. Prognosis and treatment decisions are influenced by tumor size, depth, grade, and histologic subtype, making accurate initial staging essential (NCCN, 2026).

Evidence Discussion

Cross-sectional imaging with MRI or CT of the primary site is strongly supported because it provides accurate delineation of tumor extent, which is critical for staging and surgical planning. MRI, in particular, has demonstrated high sensitivity for distinguishing tumor from surrounding tissues and identifying involvement of adjacent structures, thereby reducing the risk of incomplete resection and improving local control (Noebauer-Huhmann et al., 2020). While CT serves as an alternative when MRI is contraindicated, reliance on MRI when feasible optimizes diagnostic accuracy without exposing patients to ionizing radiation.

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CT imaging of the chest is essential for staging due to the high prevalence of pulmonary metastases in soft tissue sarcomas. Early identification of lung metastases directly impacts treatment decisions, including eligibility for surgical resection, systemic therapy, or palliative approaches. Evidence supports the use of a single-phase CT rather than multiple phases, as additional imaging does not significantly improve diagnostic yield but increases radiation exposure, reinforcing a strategy that balances diagnostic accuracy with harm reduction (NCCN, 2026).

Histology-directed and risk-adapted imaging strategies are supported by evidence demonstrating variability in metastatic patterns among sarcoma subtypes. Certain histologies, such as those with propensity for lymphatic or intra-abdominal spread, benefit from additional cross-sectional imaging of the abdomen and pelvis, while routine imaging beyond the chest is not necessary for most extremity or superficial tumors. This selective approach minimizes unnecessary imaging, reduces false-positive findings, and avoids additional procedures and patient anxiety (NCCN, 2026).

The selective use of advanced imaging modalities such as FDG-PET/CT is supported in specific clinical scenarios, including indeterminate tumor grade, inconclusive conventional imaging, or evaluation of suspected limited metastatic disease amenable to local therapy. PET/CT can improve detection of metabolically active disease and assist in treatment planning; however, its routine use is limited by cost, variability in specificity, and potential for false-positive results (Kelly et al., 2021). Overall, the evidence supports a tailored imaging strategy that prioritizes MRI for local staging, CT chest for metastatic evaluation, and selective adjunct imaging to maximize diagnostic value while minimizing unnecessary harms.

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Soft Tissue Sarcomas – Restaging/ Recurrence (ONC-12.3)

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Criteria

Indication	Medically Necessary Imaging Study
ANY of the following in individuals with soft tissue sarcomas: • After preoperative radiotherapy • After surgical resection	• MRI without and with contrast or CT with contrast of affected body area • CT Chest with contrast (CPT® 71260) OR without contrast (CPT® 71250) (if the primary site is the chest, MRI Chest without and with contrast (CPT® 71552) or MRI Chest with contrast CPT® 71550))
Baseline end of therapy evaluation, including completion of adjuvant radiotherapy in individuals with soft tissue sarcomas	• Same studies as initial work-up (See **Soft Tissue Sarcomas - Initial Work-up/Staging (ONC-12.2)**)
ANY of the following in individuals with soft tissue sarcomas: • Differentiate tumor from radiation or surgical fibrosis • Determine response to neoadjuvant therapy • Confirm oligometastatic disease prior to curative intent surgical resection	• PET/CT (CPT® 78815 or CPT® 78816) ◦ If treated with radiation therapy, PET/CT no sooner than 12 weeks (3 months) post completion of radiation therapy

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Indication	Medically Necessary Imaging Study
EITHER of the following in individuals with soft tissue sarcomas: • Chemotherapy response for individuals with measurable disease • Individuals on neoadjuvant treatment without known lung involvement	• CT with contrast or MRI without and with contrast of affected body area every 2 cycles
Unresectable or metastatic disease on chemotherapy in individuals with soft tissue sarcomas	Every 2 cycles: • CT with contrast or MRI without and with contrast of affected body area AND • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)
Recurrence suspected in individuals with soft tissue sarcomas	• Repeat all imaging for initial workup of specific histology and/or primary site and other symptomatic areas (See **Soft Tissue Sarcomas - Initial Work-up/ Staging (ONC-12.2)**)
Preoperative planning prior to resection in individuals with soft tissue sarcomas	ANY or ALL of the following: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area
Dermatofibrosarcoma Protuberans (DFSP)	• CT without contrast or with contrast of the affected body part or MRI without contrast or without and with contrast of the affected body part • CT Chest with contrast (CPT® 71260) or CT Chest without (CPT® 71250) contrast for: ◦ Known prior thoracic disease ◦ New or worsening pulmonary symptoms ◦ New or worsening chest x-ray ◦ Sarcomatous differentiation

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Indication	Medically Necessary Imaging Study
Malignant phyllodes tumor of the breast (not benign or borderline) after resection or radiotherapy	See **Soft Tissue Sarcomas - Surveillance/Follow-up (ONC-12.4)**
Diffuse tenosynovial giant cell tumors	• MRI of the affected site every 6-12 months for individuals with symptomatic disease but not on active therapy • For individuals on active therapy, MRI of the affected site every 3-4 months

Background and Supporting Information

Soft tissue sarcomas encompass a diverse group of mesenchymal tumors with varying risks of local recurrence and metastatic spread based on histologic subtype, tumor grade, and adequacy of initial treatment. Following definitive therapy, recurrence may occur locally at the primary site or distantly, most commonly in the lungs, necessitating a structured imaging approach for restaging and treatment response assessment (NCCN, 2026).

Local recurrence is influenced by tumor biology and completeness of surgical resection. For example, dermatofibrosarcoma protuberans (DFSP), a low-grade soft tissue sarcoma, demonstrates a high propensity for local recurrence due to subclinical extensions, while metastatic spread is uncommon but can occur in advanced or transformed disease (NCCN, 2026). These patterns highlight the importance of accurate imaging to differentiate post-treatment changes from recurrent disease and guide management decisions.

Evidence Discussion

Cross-sectional imaging of the primary site with MRI or CT following preoperative radiotherapy or surgical resection is supported because of its ability to accurately evaluate treatment response, residual disease, and early recurrence. MRI is particularly valuable for differentiating tumor recurrence from post-treatment fibrosis or scarring due to its superior soft tissue contrast, while CT provides an alternative when MRI is contraindicated. This approach improves detection of clinically relevant disease while minimizing unnecessary procedures (Noebauer-Huhmann et al., 2020; NCCN, 2026).

Routine inclusion of chest imaging is supported in most restaging scenarios due to the high incidence of pulmonary metastases across many soft tissue sarcoma subtypes. However, evidence and NCCN guidance indicate that in the absence of known lung involvement or symptoms, frequent restaging of the chest during active treatment

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provides limited additional benefit and increases radiation exposure and the risk of incidental findings. This supports a more selective, risk-adapted approach to thoracic imaging (NCCN, 2026).

PET/CT is supported as an adjunct tool in specific clinical scenarios, including differentiating recurrent tumor from post-treatment changes, assessing response to neoadjuvant therapy, and confirming limited metastatic disease prior to curative-intent resection. Evidence suggests that metabolic parameters such as changes in tumor FDG uptake can predict recurrence risk and treatment response, thereby informing clinical decision-making. However, PET/CT is not routinely required due to cost, limited specificity, and potential false-positive findings, reinforcing its role as a problem-solving modality (NCCN, 2026).

Serial imaging during systemic or neoadjuvant therapy, typically every two treatment cycles, is considered medically necessary to assess treatment response and guide ongoing management. This interval balances the need for timely identification of progression with minimizing cumulative radiation exposure. Overall, the evidence supports a tailored imaging strategy that prioritizes modality selection based on tumor biology, treatment phase, and clinical scenario, optimizing diagnostic accuracy while limiting harms such as radiation exposure, false-positive findings, and unnecessary downstream interventions (NCCN, 2026; Noebauer-Huhmann et al., 2020).

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Soft Tissue Sarcomas - Surveillance/ Follow-up (ONC-12.4)

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Criteria

Indication	Medically Necessary Imaging Study
For any of the following: • Retroperitoneal/intra-abdominal primary site (including pelvic primary site) in individuals with soft tissue sarcomas • Angiosarcoma • Epithelioid sarcoma	ANY or ALL of the following every 3 months for 3 years, then every 6 months for 2 more years, then annually: • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • CT Abdomen and Pelvis with contrast (CPT® 74177) OR MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) • CT with contrast or MRI without and with contrast of any other involved body areas
Myxoid/round cell liposarcoma	ANY or ALL of the following every 3 months for 2 years, then every 6 months for 2 more years, then annually: • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • CT Abdomen and Pelvis with contrast (CPT® 74177) OR MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) • CT with contrast or MRI without and with contrast of any other involved body areas • MRI Cervical/Thoracic/Lumbar Spine without and with contrast (CPT® 72156, CPT® 72157, and CPT® 72158)

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Indication	Medically Necessary Imaging Study
Low-grade/Stage I extremity or trunk, primary site in individuals with soft tissue sarcomas	ANY or ALL of the following every 6 months for 2 years, then annually thereafter: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT with contrast, MRI without contrast, or MRI without and with contrast of primary site
Any soft tissue sarcoma not addressed elsewhere in these surveillance guidelines	ANY or ALL of the following every 3 months for 2 years, then every 6 months for 2 more years, then annually: • CT with contrast, MRI without contrast, or MRI without and with contrast of primary site • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • CT with contrast or MRI without and with contrast of any other involved body areas
ANY of the following: • Angiosarcoma • Alveolar soft part sarcoma • Cardiac sarcoma	In addition to the above studies (CT or MRI of primary site and any other involved body areas, CT Chest): • MRI Brain without and with contrast (CPT® 70553) annually For surveillance of individuals with known brain metastases, see: **Brain Metastases (ONC-31.3)**
Desmoid tumors	ONE of the following every 3 months for 3 years, then every 6-12 months: • CT without contrast or with contrast of the affected body part • MRI without contrast or without and with contrast of the affected body part
Dermatofibrosarcoma Protuberans	• No routine imaging unless clinical signs/symptoms of recurrence

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Indication	Medically Necessary Imaging Study
Malignant phyllodes tumor of the breast (not borderline or benign)	ANY or ALL of the following every 3-6 months for 3 years, then every 6 months for 2 years, and then annually • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Breast bilateral without and with contrast (CPT® 77049)
Completely resected tenosynovial giant cell tumors and/or asymptomatic diffuse tenosynovial giant cell tumors not on systemic therapy	Advanced imaging is only considered medically necessary for restaging and/or suspected recurrence/ progression • No further advanced imaging is considered medically necessary for asymptomatic individuals who are not on active therapy

Background and Supporting Information

Soft tissue sarcomas are a heterogeneous group of malignancies with variable risks of local recurrence and distant metastasis that are strongly influenced by tumor grade, size, depth, and histologic subtype. Patterns of recurrence differ significantly across subtypes, with many sarcomas demonstrating a predilection for pulmonary metastases, while others more commonly recur locally or involve extrapulmonary sites such as the abdomen, spine, or brain (NCCN, 2026).

These biologic differences form the basis for risk-adapted surveillance strategies. Local recurrence is particularly influenced by surgical margins and tumor biology, while distant recurrence, most commonly in the lungs, reflects hematogenous spread. Certain subtypes, such as myxoid/round cell liposarcoma, may metastasize to atypical locations including the spine, while others such as angiosarcoma may involve the brain (NCCN, 2026; Noebauer-Huhmann et al., 2020).

Evidence Discussion

Surveillance imaging strategies are supported by evidence demonstrating that recurrence patterns in soft tissue sarcomas are histology-specific, justifying tailored imaging intervals and modalities. NCCN recommendations for more intensive surveillance during the first 2–3 years after treatment reflect the higher likelihood of recurrence during this period, with gradual de-escalation over time as recurrence risk declines (NCCN, 2026). This approach improves early detection of clinically significant recurrence while avoiding prolonged exposure to unnecessary imaging.

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Imaging of the chest is a cornerstone of surveillance due to the high incidence of pulmonary metastases across most soft tissue sarcoma subtypes. CT is favored due to its sensitivity for detecting small lung lesions that may be amenable to surgical resection or systemic therapy. However, the frequency and duration of chest imaging are adjusted based on tumor risk, balancing early detection with cumulative radiation exposure and cost (NCCN, 2026).

Cross-sectional imaging of the primary site with MRI or CT is supported for detecting local recurrence, particularly in higher-risk or deep-seated tumors. MRI is especially valuable for differentiating recurrent tumor from post-treatment changes such as fibrosis due to its superior tissue characterization. This reduces diagnostic uncertainty and limits unnecessary biopsies or interventions, though repeated imaging carries potential risks of cost and, in the case of CT, radiation exposure (Noebauer-Huhmann et al., 2020).

Evidence also supports limiting imaging intensity in lower-risk populations. A randomized noninferiority trial demonstrated that less intensive surveillance did not result in worse survival outcomes compared with more frequent imaging, suggesting that excessive surveillance may not improve outcomes while increasing harms such as radiation exposure, false-positive findings, and downstream procedures (Puri et al., 2014). Additionally, PET/CT is not recommended for routine asymptomatic surveillance due to lack of demonstrated benefit and increased risk of false-positive findings and unnecessary interventions (NCCN, 2026). Collectively, these data support a risk-adapted surveillance strategy that aligns imaging intensity with tumor biology, maximizing clinical benefit while minimizing harms.

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Gastrointestinal Stromal Tumor (GIST) (ONC-12.5)

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Criteria

Indication	Medically Necessary Imaging Study
Suspected/Diagnosis of GIST	• CT Abdomen and Pelvis with contrast (CPT® 74177)
Initial Work-up/Staging of GIST	• CT Chest (CPT® 71260) with contrast or CT Chest without contrast (71250) and • CT Abdomen and Pelvis (CPT® 74177) with contrast, if not already performed
In addition to the above imaging for initial staging of either of the following in individuals with GIST: • Liver lesions noted on initial CT • Preoperative assessment of liver	• MRI Abdomen without and with contrast (CPT® 74183)
Monitoring response to treatment (every 8 to 12 weeks) in any of the following in individuals with GIST: • Unresectable primary disease • Metastatic disease • Resectable disease with significant morbidity	EITHER of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Additional treatment response, in addition to the above imaging, for known or suspected chest involvement in individuals with GIST	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)
Evaluation of inconclusive findings on conventional imaging in individuals with GIST	• PET/CT (CPT® 78815)

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Indication	Medically Necessary Imaging Study
Surveillance for any of the following in individuals with GIST: • Incompletely resected • Metastatic disease • High-risk disease	Every 3 months for 5 years, then annually: • CT Abdomen and Pelvis with contrast (CPT® 74177)
Surveillance for completely resected, low-risk disease in individuals with GIST	Every 6 months for 5 years, then annually: • CT Abdomen and Pelvis with contrast (CPT® 74177)
Known or suspected recurrence in individuals with GIST	ANY or ALL of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) for known or suspected liver involvement • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for known or suspected chest involvement

Background and Supporting Information

Gastrointestinal stromal tumors (GIST) are the most common mesenchymal tumors of the gastrointestinal tract and arise most frequently in the stomach and small intestine. They are driven primarily by activating mutations in the KIT or PDGFRA genes and exhibit a wide spectrum of biologic behavior, ranging from indolent lesions to aggressive malignancies with metastatic potential. The liver and peritoneal surfaces are the most common sites of metastatic spread, while lymph node and extra-abdominal metastases are uncommon except in advanced disease (NCCN, 2026).

Risk stratification in GIST is estimated by a prognostic model based on location, size of primary tumor, and mitotic rate per high power field (HPF), which together predict the likelihood of recurrence and guide treatment decisions. Larger tumor size and higher mitotic activity are associated with increased malignant potential and recurrence risk, with high-risk tumors requiring more intensive surveillance and systemic therapy considerations. The high-risk category includes any tumor >5cm with >5 mitoses/50 HPF and any tumors >10cm in size regardless of mitotic rate (NCCN, 2026).

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Evidence Discussion

CT of the abdomen and pelvis with contrast is the primary imaging modality for diagnosis and staging due to its high sensitivity for detecting primary tumors and metastatic disease, particularly in the liver and peritoneum. NCCN guidelines identify contrast-enhanced CT as the imaging modality of choice for characterizing abdominal masses and evaluating disease extent, providing comprehensive anatomic detail necessary for staging and treatment planning. Limiting advanced imaging prior to confirmed diagnosis helps reduce unnecessary radiation exposure and incidental findings without compromising diagnostic accuracy (NCCN, 2026).

MRI serves as an important adjunct in selected scenarios, particularly for evaluation of indeterminate liver lesions or preoperative assessment of hepatic involvement. MRI provides superior soft tissue contrast and more precise characterization of liver metastases, complementing CT findings and improving diagnostic confidence in complex cases. This selective use balances improved lesion characterization with considerations of cost and resource utilization (NCCN, 2026).

For treatment response assessment, serial imaging with CT or MRI every 8–12 weeks is supported by evidence demonstrating that this interval aligns with the expected therapeutic response timeframe for TKI therapy. NCCN notes a high correlation between contrast-enhanced CT and PET/CT findings, supporting CT as the preferred routine modality for monitoring response while avoiding additional radiation exposure and cost associated with PET/CT. More frequent imaging may lead to premature or inaccurate treatment decisions, while less frequent imaging may delay identification of disease progression (NCCN, 2026).

PET/CT provides functional assessment and may detect early metabolic changes that precede anatomic response, making it useful in specific clinical scenarios such as inconclusive conventional imaging or early evaluation of treatment efficacy. However, PET/CT is not a substitute for diagnostic CT and is not recommended for routine use due to limited additional benefit, potential false-positive findings, and increased cost (NCCN, 2026).

Surveillance strategies are risk-adapted, with more frequent imaging for high-risk, incompletely resected, or metastatic disease and less frequent imaging for low-risk tumors. NCCN supports imaging every 3–6 months for the first five years, when recurrence risk is highest, followed by less frequent imaging thereafter. This approach maximizes early detection of recurrence while minimizing cumulative radiation exposure, unnecessary imaging, and downstream interventions (NCCN, 2026).

Health Equity Considerations

Gastrointestinal stromal tumors (GIST) are rare mesenchymal neoplasms that require timely imaging, molecular characterization, and multidisciplinary care to guide surgical

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and systemic treatment. As with other rare cancers, disparities in access to specialized expertise, advanced imaging, and molecular testing can meaningfully influence outcomes. Population-level studies of rare malignancies demonstrate that patients who are uninsured, underinsured, or residing in socioeconomically disadvantaged or rural settings are more likely to experience delays in diagnosis and treatment, contributing to larger tumor size and higher risk features at presentation (Hu et al., 2022). Because risk stratification and treatment planning in GIST rely heavily on cross-sectional imaging for tumor localization, staging, and assessment of treatment response, inequities in access to high-quality imaging and subspecialty interpretation may disproportionately affect underserved populations. Limited access to specialty centers with sarcoma expertise may further compound disparities, as GIST management often requires coordination across surgical oncology, medical oncology, pathology, and radiology services.

Globally, structural differences in health-care infrastructure and access to specialized cancer services further accentuate inequities in the diagnosis and management of rare tumors such as GIST. International surveys of sarcoma care consistently report lower availability of advanced imaging modalities, molecular diagnostics, and coordinated multidisciplinary pathways in low- and middle-income regions, with corresponding delays in referral and treatment initiation (Zamora et al., 2025). These inequities may limit appropriate risk assessment, delay initiation of targeted therapy, and hinder optimal surveillance strategies. Standardized, evidence-based oncology imaging guidelines play a key role in promoting health equity by supporting consistent diagnostic evaluation, staging, and follow-up across diverse care settings. When combined with timely referral to experienced centers and efforts to reduce financial and geographic barriers, guideline-concordant imaging pathways can help mitigate disparities and improve outcomes for patients with gastrointestinal stromal tumors.

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Bone Sarcomas – Initial Work-up/Staging (ONC-12.6)

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Criteria

- Osteogenic sarcoma (Osteosarcoma) in individuals of all ages should be imaged according to guidelines in **Osteogenic Sarcoma (OS) (PEDONC-9.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Ewing sarcoma and Primitive Neuroectodermal Tumor in individuals of all ages should be imaged according to guidelines in **Ewing Sarcoma and Primitive Neuroectodermal Tumors (ESFT) (PEDONC-9.4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Extraskeletal myxoid chondrosarcoma in individuals of all ages should be imaged according to Soft Tissue Sarcomas (**ONC-12.2**, **ONC-12.3**, and **ONC-12.4**).
- Bone sarcomas not addressed in this guideline are exceedingly rare and will be evaluated on a case-by-case basis.

Indication	Medically Necessary Imaging Study
Chondrosarcoma • Low-grade intra-compartmental • High-grade (grade II or grade III) • Clear cell • Extra-compartmental	ANY or ALL of the following: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast
Dedifferentiated chondrosarcoma	See: **Osteogenic Sarcoma (OS) (PEDONC-9.3)** for imaging
Mesenchymal chondrosarcoma	See: **Ewing's Sarcoma Family of Tumors (PEDONC-9.4)** for imaging

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Indication	Medically Necessary Imaging Study
Chordoma	ANY or ALL of the following: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar (CPT® 72158) Spine without and with contrast • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)
Chordoma with inconclusive findings on conventional imaging	PET/CT (CPT® 78815 or CPT® 78816)

Background and Supporting Information

Bone sarcomas are malignant tumors arising from osseous tissues and include multiple histologic subtypes with distinct biologic behaviors and patterns of spread. Imaging plays a central role in initial work-up and staging by defining local tumor extent, identifying metastatic disease, and guiding multidisciplinary treatment planning. Prognosis is influenced by tumor grade, size, anatomic location, and presence of metastases, making comprehensive staging essential at diagnosis (NCCN, 2026).

Evidence Discussion

Cross-sectional imaging of the primary site with MRI or CT is supported as it provides optimal delineation of tumor extent and local staging. MRI is particularly advantageous for assessing marrow involvement, soft tissue extension, and neurovascular encasement, while CT is useful for characterizing cortical bone destruction and mineralized matrix. The ability to select either modality allows clinicians to tailor imaging to tumor location and patient-specific considerations, optimizing diagnostic accuracy while minimizing unnecessary radiation exposure (NCCN, 2026).

CT of the chest is essential for staging due to the high incidence of pulmonary metastases in malignant bone sarcomas. Evidence supports CT as the most sensitive modality for detecting lung metastases, directly influencing staging and management

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decisions. Importantly, performing CT with both contrast and noncontrast phases does not provide additional clinical benefit and results in increased radiation exposure, supporting the use of a single-phase CT approach (NCCN, 2026).

For chordoma, a broader imaging strategy is supported due to its unique biologic behavior and propensity for axial and distant spread. Imaging of the abdomen and pelvis with contrast, along with MRI of the entire spine and bone scan, improves detection of metastatic or multifocal disease that may not be identified with more limited imaging. While this expanded imaging increases diagnostic yield, it must be balanced against increased cost and exposure, reinforcing its indication specifically for this histology rather than routine use across all bone sarcomas (NCCN, 2026).

PET/CT is supported as a problem-solving modality when conventional imaging is inconclusive. Although PET/CT can provide functional assessment and improve detection of metabolically active disease, its routine use in initial staging is not recommended due to limited sensitivity and specificity compared with standard imaging modalities and the potential for false-positive findings. Restricting PET/CT to select scenarios minimizes unnecessary costs, radiation exposure, and downstream interventions while maintaining diagnostic accuracy (NCCN, 2026).

Health Equity Considerations

Bone sarcomas are rare, aggressive malignancies that require early recognition, advanced imaging, biopsy planning, and timely management within specialized multidisciplinary sarcoma centers to optimize outcomes. However, access to high-quality diagnostic and treatment services is unevenly distributed, resulting in meaningful disparities across socioeconomic, racial, and geographic lines. In the United States, population-based analyses demonstrate that insurance status is strongly associated with stage at diagnosis, treatment receipt, and outcomes. Individuals who are uninsured or covered by Medicaid are significantly more likely to present with metastatic disease at diagnosis compared with insured individuals, reflecting delayed access to diagnostic imaging and specialty care (Hu et al., 2022). In addition, Black and Asian/Pacific Islander individuals are less likely to undergo definitive surgical resection, and Black individuals are less likely to receive chemotherapy, even after adjustment for tumor and demographic factors, highlighting inequities in access to guideline-concordant multimodality treatment (Hu et al., 2022). These disparities are particularly impactful for bone sarcomas, where survival is highly dependent on timely imaging-guided diagnosis, surgical management, and coordinated systemic therapy.

Globally, disparities in bone sarcoma care are further amplified by limited access to specialized sarcoma services and advanced imaging technologies. A multinational survey of orthopaedic oncologists found that fewer than half of individuals worldwide are treated primarily in specialized sarcoma centers, with markedly lower access in low- and middle-income countries (Zamora et al., 2025). Respondents from these regions

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reported frequent treatment delays, compromised surgical management due to prior inappropriate procedures, and inconsistent access to advanced imaging modalities such as PET-CT and molecular diagnostic studies, all of which are critical for accurate staging and treatment planning (Zamora et al., 2025). These structural inequities contribute to later presentation, suboptimal imaging-based evaluation, and worse outcomes. Standardized, evidence-based oncology imaging guidelines are therefore essential to promoting equitable care by supporting consistent diagnostic pathways, appropriate staging, and treatment response assessment across diverse health-care settings. When combined with timely referral to experienced sarcoma centers and efforts to reduce insurance- and resource-based barriers, guideline-concordant imaging can help mitigate disparities and improve outcomes for individuals with bone sarcomas.

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Bone Sarcomas – Restaging/Recurrence (ONC-12.7)

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Criteria

- Bone sarcomas not addressed in this guideline are exceedingly rare and will be evaluated on a case-by-case basis.

Indication	Medically Necessary Imaging Study
Chondrosarcoma • Low-grade intra-compartmental • High-grade (grade II or grade III) • Clear cell • Extra-compartmental	ANY or ALL of the following, after completion of radiotherapy or every 2 cycles of chemotherapy: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast
Suspected recurrence of atypical cartilaginous tumor (low-grade intra-compartmental appendicular tumor)	ANY or ALL of the following: • MRI without contrast or without and with contrast of involved area or CT (contrast as requested) of involved area • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) Imaging in Oncology [ONC-1.3]** for additional bone scan codes)
Dedifferentiated chondrosarcoma	See: **Osteogenic Sarcoma (OS) (PEDONC-9.3)** for imaging recommendations
Mesenchymal chondrosarcoma	See: **Ewing's Sarcoma Family of Tumors (PEDONC-9.4)** for imaging recommendations

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Indication	Medically Necessary Imaging Study
Chordoma	ANY or ALL of the following, after completion of radiotherapy or every 2 cycles of chemotherapy: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) Imaging in Oncology [ONC-1.3]** for additional bone scan codes)
Chordoma with inconclusive findings on conventional imaging	PET/CT (CPT® 78815 or CPT® 78816)

Background and Supporting Information

Bone sarcomas represent a group of malignant tumors of osseous origin with variable biologic behavior and recurrence risk depending on histologic subtype, grade, and adequacy of treatment. Following definitive therapy, recurrence may occur locally at the primary site or distantly, most commonly in the lungs due to hematogenous spread. Imaging plays a central role in restaging to assess treatment response, detect recurrence, and guide further management (NCCN, 2026).

Patterns of recurrence differ by tumor subtype and grade. Chondrosarcoma subtypes range from low-grade tumors with limited metastatic potential to high-grade lesions with a higher risk of distant spread, particularly to the lungs. Chordomas, in contrast, demonstrate locally aggressive behavior with potential for distant metastases, including spread along the axial skeleton, necessitating tailored imaging strategies (NCCN, 2026).

Evidence Discussion

MRI or CT of the primary tumor site following treatment is supported for evaluating local recurrence and treatment response. MRI provides superior soft tissue contrast and allows differentiation between residual or recurrent tumor and post-treatment changes, such as fibrosis or necrosis. CT serves as an alternative modality when MRI is contraindicated or when osseous detail is required for assessing cortical involvement. This dual-modality approach improves diagnostic accuracy while allowing flexibility based on patient and tumor characteristics (NCCN, 2026).

CT Chest imaging is essential for restaging due to the high incidence of pulmonary metastases in bone sarcomas. Evidence supports CT as the most sensitive modality

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for detecting lung metastases, which directly impacts prognosis and management decisions. Routine inclusion of chest imaging ensures early detection of metastatic disease; however, restricting imaging to a single-phase CT reduces radiation exposure without compromising diagnostic yield (NCCN, 2026).

For atypical cartilaginous tumors and selected low-grade lesions with suspected recurrence, the addition of bone scan is supported to evaluate for osseous metastases or multifocal disease. While bone scan increases sensitivity for detecting skeletal involvement, its use is reserved for specific clinical scenarios to limit false-positive findings and unnecessary downstream testing. This selective approach balances improved detection with avoidance of overimaging (NCCN, 2026).

Advanced imaging such as PET/CT is not routinely recommended for restaging but may be useful when conventional imaging is inconclusive. PET/CT provides metabolic information that can help distinguish viable tumor from post-treatment changes and clarify indeterminate findings. However, limitations in sensitivity and specificity, along with potential for false-positive results, support its role as a problem-solving modality rather than routine imaging, minimizing unnecessary radiation exposure and cost (NCCN, 2026).

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Bone Sarcomas – Surveillance/Follow-up (ONC-12.8)

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Criteria

Indication	Medically Necessary Imaging Study
• Intra-compartmental Chondrosarcoma	ANY or ALL of the following every 6-12 months for 2 years, then annually for 10 years: • Plain x-ray of primary site ◦ MRI without and with contrast for new findings on plain x-ray or new/worsening clinical symptoms • Chest x-ray ◦ CT Chest with (CPT® 71260) or without (CPT® 71250) contrast for new findings on chest x-ray, or new/ worsening signs/symptoms
• Grade I, II, or III Chondrosarcoma • Clear Cell Chondrosarcoma • Extra-compartmental Chondrosarcoma • Low-grade extra-compartmental appendicular tumors	ANY or ALL of the following every 6 months for 5 years, then annually for 10 years: • Plain x-ray of primary site ◦ MRI without and with contrast for new findings on plain x-ray or new/worsening clinical symptoms • CT Chest with (CPT® 71260) **or** CT Chest without (CPT® 71250) contrast
Dedifferentiated chondrosarcoma	See: **Osteogenic Sarcoma (OS) (PEDONC-9.3)** for imaging recommendations
Mesenchymal chondrosarcoma	See: **Ewing's Sarcoma Family of Tumors (PEDONC-9.4)** for imaging recommendations

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Indication	Medically Necessary Imaging Study
Chordoma	• Plain x-ray of primary site every 6 months for 5 years and then annually until year 10 ◦ MRI without and with contrast for new findings on plain x-ray or new/worsening clinical symptoms. • Chest x-ray every 6 months for 5 years and then annually until year 10 ◦ CT Chest with (CPT® 71260) or without (CPT® 71250) contrast annually or for evaluation of any new findings on chest x-ray or new/worsening signs/symptoms

Background and Supporting Information

Bone sarcomas are malignant tumors of osseous origin with variable biologic behavior and risk of recurrence depending on histologic subtype, grade, and adequacy of initial treatment. Following definitive therapy, the risk of recurrence is highest within the first several years, with the majority of relapses occurring in the lungs or at the primary site. Surveillance strategies are therefore designed to detect potentially treatable local and metastatic recurrence during this high-risk period (NCCN, 2026).

Patterns of recurrence vary across subtypes. Chondrosarcomas may recur locally or metastasize depending on grade and extent, while chordomas are characterized by local aggressiveness and potential for distant spread, particularly along the axial skeleton. These variations in tumor biology inform surveillance imaging strategies, including modality selection and follow-up intervals (NCCN, 2026).

Evidence Discussion

Surveillance imaging strategies in bone sarcoma are supported by evidence demonstrating limited clinical benefit from routine advanced imaging in asymptomatic individuals. Studies indicate that less than 20% of local recurrences are detected through advanced imaging alone in the absence of symptoms, suggesting that routine use of high-intensity imaging may not significantly improve early detection. This supports the use of plain radiography as the primary modality for local surveillance, reserving MRI for cases with abnormal findings or clinical concern (NCCN, 2026).

Chest imaging is an essential component of surveillance given the predilection for pulmonary metastases. Evidence supports the use of chest radiography or CT based on tumor grade and clinical context, with higher sensitivity observed in higher-grade disease. CT provides greater sensitivity for small pulmonary nodules, but its use is often reserved for abnormal chest radiograph findings or clinical suspicion to minimize cumulative radiation exposure (NCCN, 2026).

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Risk-adapted surveillance intervals are supported by recurrence patterns, with more frequent imaging in the first several years after treatment and decreasing frequency over time. This approach maximizes detection of recurrence during periods of highest risk while reducing unnecessary imaging in later years when recurrence becomes less likely. Evidence suggests that recurrence beyond 10 years is rare, and continued routine surveillance imaging in asymptomatic patients beyond this period yields limited clinical benefit while increasing costs and potential harms (NCCN, 2026).

Overall, the evidence supports a conservative, risk-adapted surveillance strategy that emphasizes the use of low-radiation modalities such as plain radiographs and selective use of advanced imaging based on clinical findings. This approach balances early detection of recurrence with minimization of radiation exposure, false-positive findings, and downstream interventions, aligning imaging intensity with both tumor biology and patient risk (NCCN, 2026).

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Benign Bone Tumors – General Considerations (ONC-12.9)

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Criteria

- Plain x-ray appearance is diagnostic for many benign bone tumors and advanced imaging is generally not considered medically necessary except for preoperative planning.
- MRI without and with contrast is the primary modality for advanced imaging of bone tumors and is considered medically necessary to help narrow differential diagnoses and determine whether biopsy is indicated.
- Some benign bone tumor types carry a risk of malignant degeneration over time, but routine advanced imaging surveillance has not been shown to improve outcomes for these individuals.
- MRI without and with contrast is considered medically necessary to evaluate new findings on plain x-ray new/worsening clinical symptoms not explained by a recent plain x-ray.
- There are no data to support the use of PET/CT in the evaluation of benign bone tumors, and PET requests are not considered medically necessary without biopsy confirmation of a malignancy.
- Other benign bone tumors should be imaged according to guidelines in **Bone Lesion (MS-10.2)** in the General Musculoskeletal Imaging Guidelines or **Mass Involving Bone (including Lytic and Blastic Metastatic Disease) (PEDMS-3.4)** in the Pediatric Musculoskeletal Imaging Guidelines.

Background and Supporting Information

Benign bone tumors represent a diverse group of nonmalignant osseous lesions arising from cartilage, bone, fibrous tissue, or vascular elements. These lesions include entities such as osteochondroma, enchondroma, chondroblastoma, osteoid osteoma, and giant cell tumor of bone, each with distinct imaging and clinical characteristics. Many benign lesions are discovered incidentally and may remain asymptomatic, with diagnosis often based on imaging features in conjunction with individual age, lesion location, and growth behavior (Expert Panel on Musculoskeletal Imaging, 2024; NCCN, 2026).

Evidence Discussion

Plain radiography is the primary imaging modality for benign bone tumors because many lesions have characteristic appearances that allow accurate diagnosis without

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additional imaging. Evidence demonstrates that radiographs provide sufficient information to classify lesions based on margins, matrix, and periosteal reaction, enabling differentiation between benign and aggressive processes in most cases (Expert Panel on Musculoskeletal Imaging, 2024). Utilizing radiographs as the initial and often sole imaging modality reduces unnecessary radiation exposure, cost, and downstream testing associated with more advanced imaging.

Advanced imaging with MRI or CT is supported when radiographic findings are indeterminate or when there are features concerning for malignancy. MRI, in particular, offers superior soft tissue characterization and can help define lesion extent, evaluate marrow involvement, and guide biopsy planning when needed. CT provides complementary information regarding cortical integrity and matrix mineralization. Restricting advanced imaging to these scenarios improves diagnostic accuracy while minimizing unnecessary imaging in clearly benign lesions (Expert Panel on Musculoskeletal Imaging, 2024; NCCN, 2026).

Selective use of advanced imaging also helps mitigate potential harms associated with overimaging, including false-positive findings, incidentalomas, and unnecessary invasive procedures. In lesions without aggressive radiographic features, further imaging has not been shown to improve outcomes, supporting a conservative approach. Additionally, routine surveillance with advanced imaging for benign lesions with low risk of malignant transformation has not demonstrated clinical benefit, reinforcing the importance of risk-adapted imaging strategies (NCCN, 2026).

The use of PET/CT is not supported in the evaluation of benign bone tumors due to the lack of evidence demonstrating diagnostic or clinical benefit in this setting. PET/CT may produce nonspecific findings and has limited ability to distinguish benign from malignant lesions without histologic confirmation. Avoiding PET/CT in this context reduces unnecessary radiation exposure and prevents misinterpretation that could lead to inappropriate interventions (Expert Panel on Musculoskeletal Imaging, 2024; NCCN, 2026).

Health Equity Considerations

Although benign bone tumors (BBTs) are nonmalignant and often asymptomatic, inequities in access to health care, diagnostic imaging, and specialty evaluation can significantly influence detection, monitoring, and outcomes. Many BBTs are diagnosed incidentally through imaging performed for unrelated symptoms, making access to timely radiography, CT, or MRI a critical determinant of diagnosis. In medically underserved populations, limited access to primary care and diagnostic imaging may result in underdiagnosis, delayed identification, or presentation only after complications such as pain, pathologic fracture, or local tissue compression occur (Martin et al., 2025). Evidence from a large retrospective study in the Rio Grande Valley, a region characterized by high poverty rates, limited insurance coverage, and

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reduced health-care access, demonstrates substantially lower observed incidence of BBTs compared with national estimates, likely reflecting barriers to care rather than true differences in disease prevalence (Martin et al., 2025). These findings underscore how socioeconomic disadvantage and health-system access shape detection of benign musculoskeletal conditions.

Disparities may also manifest across age, sex, and cultural contexts, affecting patterns of care utilization. In predominantly Hispanic underserved communities, sociocultural factors such as medical mistrust and gender norms may further discourage early evaluation, particularly among men, contributing to delayed or missed diagnoses (Martin et al., 2025). Because some benign bone tumors can exhibit aggressive local behavior or require longitudinal imaging surveillance to assess growth or rare malignant transformation, inconsistent access to follow-up imaging can lead to avoidable morbidity (Martin et al., 2025). Standardized, evidence-based oncology imaging guidelines play an important role in promoting equity by supporting appropriate initial evaluation, differentiation from malignant lesions, and consistent surveillance strategies regardless of care setting. When applied alongside efforts to improve access to imaging services and specialty referral in underserved populations, guideline-concordant imaging can help reduce disparities and ensure safe, effective management of benign bone tumors.

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Benign Bone Tumors – Initial Work-up/ Staging (ONC-12.10)

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Criteria

Indication	Medically Necessary Imaging Study
Giant Cell Tumor of Bone (GCTB)	ANY or ALL of the following: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • Bone scan (CPT® 78306) (see also: **Nuclear Medicine (NM) in Oncology [ONC-1.3]** for additional bone scan codes)
Enchondroma	• MRI without contrast or without and with contrast of primary site

Background and Supporting Information

Benign bone tumors encompass a spectrum of nonmalignant osseous lesions, including giant cell tumor of bone (GCTB) and enchondroma, which may have variable clinical behavior ranging from indolent to locally aggressive. While many benign lesions are identified on radiographs, certain tumor types require further characterization due to overlapping imaging features with malignant lesions or potential for local recurrence, malignant transformation, or metastatic spread in rare cases (NCCN, 2026).

Giant cell tumor of bone is typically a locally aggressive neoplasm that most commonly arises in the epiphyses of long bones and may demonstrate destructive growth patterns. Although classified as benign, GCTB has the capacity for pulmonary metastases and, rarely, malignant transformation. Enchondromas are common benign cartilaginous tumors that may appear indeterminate on radiographs and can mimic low-grade chondrosarcoma, necessitating further imaging evaluation to confirm diagnosis and guide management (NCCN, 2026).

Evidence Discussion

MRI and CT of the involved area are supported for the initial work-up of giant cell tumor of bone due to their complementary roles in local staging. MRI provides high-resolution soft tissue contrast, allowing for accurate delineation of tumor extent, identification of

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marrow involvement, and detection of features suggestive of malignant transformation. CT offers improved visualization of cortical bone destruction and complex osseous anatomy, particularly in areas such as the spine or pelvis. The combined use of these modalities enhances diagnostic confidence and informs surgical and therapeutic planning (NCCN, 2026).

Systemic staging with CT of the chest is supported in GCTB due to its known, albeit uncommon, potential for pulmonary metastases. CT is more sensitive than chest radiography for detecting small pulmonary nodules and therefore improves detection of clinically significant metastatic disease. Similarly, whole-body bone scan is considered medically necessary for identifying multifocal osseous involvement or distant skeletal lesions. The inclusion of these modalities balances early detection of metastatic disease with the risks of radiation exposure, which is justified given the biologic behavior of GCTB (NCCN, 2026).

Imaging of the abdomen and pelvis is not routinely supported in the absence of relevant symptoms or clinical suspicion, as this pattern of metastatic spread is uncommon in GCTB. Limiting imaging to sites with established metastatic risk reduces unnecessary radiation exposure, cost, and incidental findings that may lead to further unnecessary evaluations. This risk-adapted approach aligns imaging with tumor biology and expected dissemination patterns (NCCN, 2026).

For enchondroma, MRI is supported as the primary advanced imaging modality when radiographic findings are indeterminate. MRI allows for detailed evaluation of internal tumor characteristics and helps differentiate benign enchondroma from low-grade chondrosarcoma or other malignant entities. Restricting advanced imaging to scenarios in which radiographs are inconclusive improves diagnostic accuracy while avoiding overutilization of imaging in lesions with classic benign features (NCCN, 2026).

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Benign Bone Tumors – Restaging/ Recurrence (ONC-12.11)

ON.ss.0012.11.A
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Criteria

Indication	Medically Necessary Imaging Study
Giant Cell Tumor of Bone (GCTB)	ANY or ALL of the following, after completion of radiotherapy or every 2 cycles of chemotherapy: • MRI without contrast or without and with contrast of involved area • CT (contrast as requested) of involved area • Bone scan (CPT® 78306 (see also: **Nuclear Medicine (NM) Imaging in Oncology [ONC-1.3]** for additional bone scan codes)
Enchondroma	Plain films of primary site

Background and Supporting Information

Benign bone tumors include a wide spectrum of nonmalignant osseous lesions with variable behavior, ranging from indolent, asymptomatic entities to locally aggressive tumors such as giant cell tumor of bone (GCTB). Although these tumors lack metastatic potential in most cases, certain subtypes, particularly GCTB, may recur locally, demonstrate aggressive growth, or rarely metastasize, most commonly to the lungs. Appropriate imaging during restaging is therefore important to assess treatment response and detect recurrence (NCCN, 2026).

GCTB typically arises in the epiphysis of long bones and can demonstrate destructive growth with a risk of recurrence after treatment. Management may include surgery, radiotherapy, or systemic therapy, with imaging used to evaluate both local disease control and potential spread. Enchondromas, by contrast, are common benign cartilage tumors that are typically indolent, with recurrence or progression evaluated primarily through imaging of the primary site (NCCN, 2026).

Evidence Discussion

For giant cell tumor of bone (GCTB), repeat cross-sectional imaging with MRI or CT is supported for restaging following treatment because of its role in assessing local tumor response and detecting recurrence. MRI provides detailed assessment of marrow and

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soft tissue involvement, while CT is useful for evaluating cortical bone and complex anatomy. When systemic therapy is administered, imaging every two treatment cycles allows for timely evaluation of treatment response and facilitates early modification of therapy if progression is identified. Following radiotherapy, imaging at treatment completion establishes a baseline for future surveillance (NCCN, 2026).

The addition of bone scan in GCTB is supported to evaluate for multifocal disease or metastatic spread, particularly given the tumor's potential for pulmonary and skeletal involvement. While this modality increases sensitivity for detecting distant osseous lesions, its use is typically limited to clinically appropriate scenarios to avoid unnecessary radiation exposure and false-positive findings. This targeted approach aligns with the biologic behavior of GCTB and optimizes staging accuracy without overutilization (NCCN, 2026).

For enchondroma, evidence supports the use of plain radiography as the primary modality for restaging and recurrence assessment after initial characterization. Once diagnosis is established with advanced imaging, surveillance with plain films is generally sufficient to confirm lesion stability or detect interval change. Advanced imaging in this setting has low diagnostic yield unless there are new or indeterminate findings on radiographs, or evolving clinical symptoms suggest possible malignant transformation or progression (NCCN, 2026).

Overall, the evidence supports a risk-adapted imaging strategy that differentiates between tumor types with varying biologic behavior. Use of advanced imaging for locally aggressive tumors such as GCTB enables early detection of recurrence and assessment of treatment response, while reliance on plain radiography for indolent lesions such as enchondroma minimizes unnecessary imaging, radiation exposure, and downstream interventions. This approach balances diagnostic accuracy with the potential harms of overimaging, including cost, incidental findings, and unnecessary procedures (NCCN, 2026).

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Benign Bone Tumors – Surveillance/ Follow-up (ONC-12.12)

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Criteria

Indication	Medically Necessary Imaging Study
Giant Cell Tumor of Bone (GCTB)	ANY or ALL of the following every 6-12 months for 4 years, then annually thereafter: • Plain x-ray of primary site ◦ MRI without and with contrast for new findings on plain x-ray, or new/worsening clinical symptoms • Chest x-ray ◦ CT Chest with (CPT® 71260) or without (CPT® 71250) contrast for new findings on chest x-ray, or new/worsening signs/ symptoms
Enchondroma	Plain films of primary site

Background and Supporting Information

Benign bone tumors represent a heterogeneous group of nonmalignant osseous lesions with variable biologic behavior, ranging from indolent, asymptomatic processes to locally aggressive tumors such as giant cell tumor of bone (GCTB). While most benign tumors remain stable over time, certain subtypes may recur locally after treatment or, in rare cases, demonstrate metastatic potential, particularly in the lungs in GCTB. Surveillance strategies are therefore tailored to tumor biology and risk of recurrence (NCCN, 2026).

GCTB is characterized by locally aggressive growth and a recognized risk of recurrence following surgical or nonsurgical therapy. Recurrence most commonly occurs at the primary site, although pulmonary metastases may develop in a small subset of patients. Enchondromas, in contrast, are typically indolent and asymptomatic lesions that are often managed conservatively, with imaging focused on confirming stability rather than detecting metastasis (NCCN, 2026).

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Evidence Discussion

Surveillance strategies for giant cell tumor of bone (GCTB) prioritize plain radiography for both the primary site and the chest, supported by evidence demonstrating that routine advanced imaging has limited benefit in asymptomatic individuals. While GCTB has potential for local recurrence and pulmonary metastases, studies have not demonstrated a clear advantage of routine advanced imaging over plain film surveillance in detecting clinically meaningful recurrence. This supports the use of periodic radiographs as the primary modality, reserving MRI or CT for cases with abnormal findings or new or worsening symptoms (NCCN, 2026).

MRI of the primary site is supported when radiographic findings are indeterminate or when clinical symptoms suggest recurrence. MRI provides superior soft tissue contrast and allows differentiation between post-treatment changes and recurrent tumor, thereby improving diagnostic accuracy when concern arises. However, its routine use in asymptomatic surveillance is not supported due to lack of demonstrated benefit and the potential for increased cost and incidental findings (NCCN, 2026).

Chest surveillance with radiography is appropriate for detecting pulmonary metastases in GCTB, with CT reserved for abnormal chest radiograph findings or new respiratory symptoms. This tiered approach balances the increased sensitivity of CT for detecting small pulmonary nodules with the need to minimize cumulative radiation exposure. Limiting CT use to clinically indicated scenarios reduces unnecessary imaging and downstream interventions while maintaining appropriate detection of clinically relevant metastatic disease (NCCN, 2026).

For enchondroma, evidence supports the use of plain radiographs alone for surveillance following initial characterization. Once stability is established with advanced imaging, further surveillance with radiographs is generally sufficient to monitor for interval change. Additional advanced imaging has low diagnostic yield in the absence of concerning radiographic findings or clinical symptoms, and its routine use may lead to unnecessary costs, radiation exposure, and potential overdiagnosis (NCCN, 2026). Overall, the evidence supports a conservative, risk-adapted surveillance approach that aligns imaging intensity with tumor biology while minimizing harms associated with overimaging.

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Pancreatic Cancer (ONC-13)

Guideline

Pancreatic Cancer – General Considerations (ONC-13.0)
Pancreatic Cancer – Screening Studies for Pancreatic Cancer (ONC-13.1)
Pancreatic Cancer – Suspected/Diagnosis (ONC-13.2)
Pancreatic Cancer – Initial Work-up/Staging (ONC-13.3)
Pancreatic Cancer – Restaging/Recurrence (ONC-13.4)
Pancreatic Cancer – Surveillance/Follow-up (ONC-13.5)
References (ONC-13)

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Pancreatic Cancer – General Considerations (ONC-13.0)

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Criteria

- This guideline refers only to adenocarcinoma of the exocrine pancreas, which accounts for over 90% of pancreatic malignancies. This guideline may also be used for cancer of the Ampulla of Vater.
- Neuroendocrine and carcinoid tumors of the pancreas are not included in this guideline, see: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)**.

Background and Supporting Information

Management of pancreatic adenocarcinoma requires accurate staging and determination of resectability, which are critical to guiding treatment decisions. NCCN emphasizes that evaluation should occur in a multidisciplinary setting at high-volume centers, incorporating expertise from radiology, surgery, medical oncology, and other specialties to optimize outcomes (NCCN, 2026).

Health Equity Considerations

Pancreatic cancer is characterized by high morbidity and mortality, with most individuals presenting at an advanced stage and limited opportunities for curative treatment. Substantial disparities have been consistently documented across the continuum of care, particularly by race, socioeconomic status, insurance coverage, and geography. Black individuals in the United States experience higher incidence and mortality rates than White individuals, driven in part by higher rates of advanced-stage disease at diagnosis and persistent inequities across multiple regions and age groups (Tavakkoli et al., 2020). Racial and ethnic minority populations, including Hispanic individuals, are also more likely to present at younger ages or with multiple risk factors, while facing barriers to timely diagnosis, referral, and treatment (Halder et al., 2023; Noel & Fiscella, 2019). These inequities are compounded by the absence of effective population-based screening modalities, making access to early diagnostic imaging and specialist evaluation especially critical for improving outcomes.

Socioeconomic factors further influence access to guideline-concordant imaging, staging, and treatment. Individuals who are uninsured, publicly insured, or of lower socioeconomic status are less likely to undergo surgical resection, receive multimodality therapy, or be treated at high-volume multidisciplinary centers, all of which are associated with improved outcomes in pancreatic cancer (Noel & Fiscella, 2019;

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Patel et al., 2025). Disparities also emerge earlier in the care pathway, including reduced participation of Black and other underrepresented individuals in surveillance programs for pancreatic cysts and early detection initiatives, despite similar stated willingness to engage in imaging surveillance or surgery when offered (Yip-Schneider et al., 2024). Evidence-based oncology imaging guidelines can help mitigate these inequities by promoting consistent diagnostic evaluation, staging, and follow-up across diverse practice settings. When paired with efforts to improve access to high-quality imaging, specialty referral, and coordinated multidisciplinary care, standardized imaging pathways support equitable delivery of care and may help reduce outcome disparities in pancreatic cancer.

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Pancreatic Cancer – Screening Studies for Pancreatic Cancer (ONC-13.1)

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Criteria

- Detailed history of any known inherited syndrome in the individual and detailed family history in first- and second-degree relatives, including the age and lineage, is essential to guide screening recommendations. See table below for age- and risk-specific screening recommendations.
- New onset of diabetes in individuals older than 50 has been recognized as a potential indicator of the development of pancreatic cancer. Approximately 1% of individuals in this category are diagnosed with cancer within 3 years. A prediction model has been established which identifies those individuals at greatest risk for pancreatic malignancy. The scoring system, known as ENDPAC (Enriching New-Onset Diabetes for Pancreatic Cancer) is based on 3 discriminatory factors, including change in blood glucose, change in weight, and age of onset at the time of the new diagnosis of diabetes. A score of greater than 3 imparts an elevated risk of pancreatic cancer (3.6%), and these individuals should be screened. Screening is not considered medically necessary at this time for scores of 0-2.

Indications	Medically Necessary Imaging Study
Individuals who meet **BOTH** of the following criteria: • One or more first- or second-degree relative affected with pancreatic cancer **AND** • Known mutation carrier of ONE of the following genes: ◦ Lynch Syndrome (MLH1, MSH2, or MSH6 gene mutations) ◦ BRCA1 ◦ PALB2 mutation ◦ EPCAM ◦ TP53	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) starting at age 50 or 10 years earlier than the youngest family member affected with exocrine pancreatic cancer, repeat annually

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Indications	Medically Necessary Imaging Study
Individuals with family history of pancreatic cancer but no known genetic mutation: • Individuals with 2 relatives with pancreatic cancer where one is a first-degree relative • Individuals with 3 or more relatives with pancreatic cancer	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) starting at age 45 or 10 years earlier than the youngest family member affected with exocrine pancreatic cancer, repeat annually
Pancreatic Cancer Kindred (individuals who have at least one first-degree relative with pancreatic cancer who in turn also has a first-degree relative with pancreatic cancer) and NO known genetic germline mutations	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) starting at age 50 or 10 years earlier than the youngest family member affected with exocrine pancreatic cancer, repeat annually
Hereditary Pancreatitis (PRSS1, CPA1, and CTRC gene mutations)	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) beginning at age 40 or 20 years after the first pancreatitis attack, repeat annually
Peutz-Jeghers Syndrome (LKB1/STK11 gene mutation)	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) starting at age 30 or 10 years earlier than the youngest family member affected with exocrine pancreatic cancer, repeat annually ◦ Family history is not required to begin imaging at age 30

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Indications	Medically Necessary Imaging Study
CDKN2A mutation (also known as p16, p16INK4a, and MTS1, FAMM-Familial Atypical Multiple Melanoma and Mole Syndrome)	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) beginning at age 40 or 10 years earlier than the youngest family member affected with exocrine pancreatic cancer, repeat annually ◦ Family history is not required to begin imaging at age 40
• BRCA2 • ATM (Ataxia-Telangiectasia)	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) starting at age 50 or 10 years earlier than the youngest family member affected with exocrine pancreatic cancer, repeat annually ◦ Family history is not required to begin imaging at age 50
Screening MRI for pancreatic cancer reveals cystic lesion of the pancreas	• Repeat MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) in 6 months
Screening MRI for pancreatic cancer reveals indeterminate solid lesion	• CT Abdomen with contrast – pancreatic protocol (CPT® 74160) • Repeat MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) in 3 months after the CT scan
Screening MRI for pancreatic cancer reveals pancreatic stricture and/or dilation 6mm or greater without a mass	• CT Abdomen with contrast – pancreatic protocol (CPT® 74160) • Repeat MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) in 3 months after the CT scan

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Indications	Medically Necessary Imaging Study
New onset diabetes in adults with ENDPAC score of 3 or higher	• CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) at baseline; if negative, repeat once after 6 months

Background and Supporting Information

ENDPAC scoring:

Blood Glucose (BG) Categories		Change BG Category Score (NOD-1y)(A)
BG Range (mg/dl)	Score	Score Range
BG Category at -1 years		1-4
<100	1	
100-109	2	
110-125	3	
BG Category at Glycemically-Defined New-Onset Diabetes		
126-160	4	
>160	5	
Change Weight Categories		Change Weight Score (B)
Change Weight (kg)	Score	Score Range
≤-6.0	+6	-6 to +6
-5.9 to -4.0	+4	
-3.9 to -2.0	+2	
-1.9 to +1.9	0	
+2.0 to +3.9	-2	
+4.0 to +5.9	-4	
≥+6.0	-6	
Age (years) at glycemically-defined new-onset diabetes		Age Score (C)

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Blood Glucose (BG) Categories		Change BG Category Score (NOD-1y)(A)
Age Range	Score	Score Range
≤59	-1	-1 to +1
60 to 69	0	
≥70	+1	
Total Score		A + B + C

Pancreatic cancer screening is focused on identifying early-stage pancreatic adenocarcinoma or high-grade precursor lesions in individuals at elevated risk, as outcomes remain poor when disease is diagnosed at an advanced stage. Risk stratification is primarily based on family history and pathogenic germline mutations in cancer susceptibility genes. High-risk groups include individuals with multiple affected first- or second-degree relatives and those with inherited syndromes such as BRCA-associated hereditary cancer syndromes, Lynch syndrome, Peutz-Jeghers syndrome, CDKN2A-associated familial atypical multiple mole melanoma, and hereditary pancreatitis (Goggins et al., 2020; NCCN, 2026).

Screening eligibility and timing are guided by estimated lifetime risk and underlying genetic predisposition. Consensus recommendations support initiation of screening at age 50 or 10 years earlier than the youngest affected relative, with earlier initiation for higher-risk syndromes such as Peutz-Jeghers or CDKN2A mutation carriers. These recommendations are designed to align screening with the natural history of disease development and earlier onset observed in hereditary populations (Goggins et al., 2020; NCCN, 2026).

In addition to hereditary and familial risk factors, new-onset diabetes in older adults has emerged as a clinically relevant marker associated with pancreatic cancer development. Predictive models such as ENDPAC incorporate age, weight change, and glycemic trends to identify individuals at increased short-term risk, supporting targeted imaging in this population (Goggins et al., 2020).

Evidence Discussion

Screening for pancreatic cancer is supported in select high-risk populations based on evidence demonstrating a substantially elevated lifetime risk and the potential for improved outcomes through early detection. The CAPS Consortium and NCCN recommend surveillance in individuals with familial clustering or pathogenic germline mutations, as these groups exceed the risk threshold at which screening may provide clinical benefit (Goggins et al., 2020; NCCN, 2026). Observational studies of surveillance programs have shown a shift toward detection of earlier-stage disease and

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high-grade precursor lesions, which are associated with improved survival compared to typical presentation at advanced stages (Goggins et al., 2020; Abe et al., 2019; de Jong et al., 2023).

In contrast, screening is not supported for average-risk individuals due to the lack of demonstrated mortality benefit and the potential harms associated with overdiagnosis and unnecessary interventions. The USPSTF has concluded that population-based screening carries moderate risk, including false-positive findings, invasive follow-up procedures, and psychological burden (USPSTF, 2019; Goggins et al., 2020). Additional studies have highlighted the low yield of screening in individuals without defined risk factors, reinforcing the need for strict adherence to risk-based eligibility criteria (Khayat et al., 2024; Hajibandeh et al., 2023).

MRI with or without MRCP is the preferred screening modality due to its high sensitivity for detecting early pancreatic lesions and its ability to evaluate pancreatic ductal anatomy without ionizing radiation. Comparative studies demonstrate that MRI and EUS are superior to CT for detection of small cystic or solid lesions, which are key targets for early diagnosis (Goggins et al., 2020; Kato et al., 2020). CT is appropriately reserved for further evaluation of indeterminate findings, improving diagnostic specificity while minimizing unnecessary radiation exposure (Goggins et al., 2020).

Short-interval follow-up imaging for indeterminate findings and targeted screening in individuals with new-onset diabetes and elevated ENDPAC scores are supported by evidence demonstrating the potential for rapid disease progression and increased short-term risk in specific populations. Data suggest that pancreatic cancer can progress from early to advanced stages within a relatively short timeframe, supporting repeat imaging at 3–6 months for suspicious findings (Goggins et al., 2020; de Jong et al., 2023). Additionally, risk prediction models incorporating metabolic changes improve identification of individuals most likely to benefit from imaging, thereby optimizing resource utilization and minimizing harms associated with unnecessary screening (Khayat et al., 2024; NCCN, 2026).

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Pancreatic Cancer – Suspected/ Diagnosis (ONC-13.2)

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Criteria

Indication	Medically Necessary Imaging Study
For any suspected symptoms of pancreatic cancer only (e.g., epigastric pain, weight loss, pain radiating to back, etc.)	• Ultrasound (CPT® 76700 or CPT® 76705) • Also see: **Right Upper Quadrant and Epigastric Pain (AB-2.3)**
Symptoms suspicious for pancreatic cancer AND any one of the following: • Abnormal labs (e.g., elevated CA 19-9, ALKP, bilirubin, or GGTP) • Abnormal physical exam findings (e.g., abdominal mass) • Abnormal or non-diagnostic ultrasound/ERCP	Any ONE of the following: • CT Pancreatic Protocol (CT Abdomen with contrast with dual phase imaging, CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377)
Preoperative studies for potentially resectable pancreatic tumors without confirmed histologic diagnosis	• See: **Pancreatic Cancer – Initial Work-up/ Staging (ONC-13.3)**

Background and Supporting Information

Pancreatic adenocarcinoma is an aggressive malignancy with a high mortality rate and is frequently diagnosed at an advanced stage due to the absence of early symptoms and the difficulty of visualizing the pancreas on routine imaging. Common presenting symptoms include epigastric pain radiating to the back, weight loss, jaundice, and fatigue, although these findings are often nonspecific and overlap with benign conditions (NCI, 2023).

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Evidence Discussion

For individuals with suspected pancreatic cancer based on symptoms alone, ultrasound is supported as an initial imaging modality due to its wide availability, absence of ionizing radiation, and ability to assess hepatobiliary causes of symptoms. However, evidence demonstrates that ultrasound has limited sensitivity for pancreatic lesions, particularly small tumors or lesions obscured by bowel gas, necessitating further evaluation when clinical suspicion persists (Pu et al., 2021; NCI, 2023). This supports its role as an initial screening tool rather than a definitive diagnostic modality.

When symptoms are accompanied by abnormal laboratory findings, physical exam abnormalities, or inconclusive initial imaging, cross-sectional imaging with CT pancreatic protocol or MRI is supported. CT demonstrates high diagnostic performance, with reported sensitivity and specificity for pancreatic cancer detection approaching 90% and 87%, respectively, allowing accurate identification of tumor location, size, vascular involvement, and metastatic disease (Pu et al., 2021). CT also offers advantages of rapid acquisition, broad availability, and lower cost, but exposes patients to ionizing radiation.

MRI provides comparable diagnostic accuracy, with sensitivity and specificity reported at approximately 89% and 90%, respectively, and offers improved characterization of soft tissue structures and pancreatic ductal anatomy (Pu et al., 2021). This makes MRI particularly useful in cases where CT findings are indeterminate or when ductal abnormalities are suspected. The lack of radiation exposure is an important benefit; however, MRI is more costly, less accessible, and may be limited by patient tolerance and contraindications. The similar diagnostic performance of CT and MRI supports flexibility in modality selection based on clinical context and patient-specific considerations.

Advanced imaging modalities such as PET/CT may provide additional functional and metabolic information but are not recommended as first-line diagnostic tools due to limitations in distinguishing malignancy from inflammatory conditions such as pancreatitis and reduced sensitivity for small lesions (Pu et al., 2021). False-positive findings from inflammatory processes and false-negative results in small tumors highlight the importance of reserving PET/CT for problem-solving scenarios. Overall, the evidence supports a stepwise imaging approach that begins with ultrasound and progresses to high-resolution cross-sectional imaging, balancing diagnostic accuracy with risks such as radiation exposure, cost, and potential for unnecessary downstream testing.

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Pancreatic Cancer – Initial Work-up/ Staging (ONC-13.3)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with pancreatic cancer	• CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with (CPT® 74177) or CT Abdomen and Pelvis without and with contrast (CPT® 74178)
For any of the following in individuals with pancreatic cancer: • Preoperative planning • CT insufficient to determine resectability	• MRI Abdomen without and with contrast (CPT® 74183) OR MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) AND/ OR • CTA Abdomen (CPT® 74175) and Pelvis (CPT® 72191) OR MRA Abdomen (CPT® 71485) and Pelvis (CPT® 72198)
Evaluation of indeterminate liver lesions in individuals with pancreatic cancer	• MRI Abdomen without and with contrast (CPT® 74183) OR • MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377)
No evidence of metastatic disease on CT or MRI AND any of the following in individuals with pancreatic cancer: • Equivocal or indeterminate conventional imaging findings • Markedly elevated CA 19-9 • Large primary tumor(s) • Enlarged regional lymph nodes • Planned neoadjuvant therapy	• PET/CT (CPT® 78815)

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Background and Supporting Information

Pancreatic adenocarcinoma is a highly aggressive malignancy characterized by early local invasion and micrometastatic spread, resulting in poor overall survival. At the time of diagnosis, only a minority of patients have disease confined to the pancreas and amenable to surgical resection, which remains the only potentially curative treatment (Sohal et al., 2020; Brennan et al., 2007). Accurate initial staging is therefore essential to determine resectability and guide appropriate management strategies.

Evidence Discussion

Contrast-enhanced CT of the chest, abdomen, and pelvis is the primary modality for initial staging due to its ability to comprehensively evaluate disease extent, including local tumor invasion, vascular involvement, and distant metastases. ASCO guidelines recommend multiphase CT as part of the initial assessment because the benefits of accurate staging and treatment planning outweigh the risks, particularly given the aggressive nature of pancreatic adenocarcinoma and its high likelihood of metastatic disease at presentation (Sohal et al., 2020).

The determination of resectability is a critical component of staging, as surgical resection offers the only potential for long-term survival. CT imaging provides essential information regarding tumor relationship to adjacent vasculature, which directly influences surgical decision-making. Evidence demonstrates that multidetector CT and CT angiography can accurately assess vascular invasion and anatomic variants, improving preoperative planning and reducing intraoperative complications (Brennan et al., 2007). However, CT may have limitations in characterizing small or indeterminate lesions, particularly in the liver.

MRI is supported as an adjunct modality when CT is insufficient for evaluation of resectability or characterization of indeterminate findings. MRI offers superior soft tissue contrast and enhanced sensitivity for detection and characterization of hepatic lesions, which may alter staging and management. The use of MRI in this context improves diagnostic accuracy but is balanced against limitations including higher cost, longer acquisition times, and reduced accessibility (Sohal et al., 2020).

PET/CT is a selective adjunct in individuals without apparent metastatic disease on conventional imaging but who demonstrate high-risk features such as large primary tumors, elevated tumor markers, or equivocal findings. Evidence indicates that PET/CT can identify occult metastatic disease and may impact management decisions by preventing unnecessary surgical intervention. However, PET/CT is not recommended as a primary staging modality due to limitations in spatial resolution, reduced sensitivity for small lesions, and potential false-positive findings in inflammatory conditions (Sohal et al., 2020). Overall, a tiered imaging strategy, using CT as the primary modality, MRI for problem-solving, and PET/CT selectively, optimizes staging accuracy while minimizing harms such as unnecessary radiation exposure, cost, and downstream procedures.

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Pancreatic Cancer – Restaging/ Recurrence (ONC-13.4)

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Criteria

Indication	Medically Necessary Imaging Study
For ANY of the following in individuals with pancreatic cancer: • After neoadjuvant therapy • Post-operative baseline • Suspected recurrence	• CT Chest with contrast (CPT® 71260) • Abdominal imaging with one of the following, using same modality as used at initial evaluation: ◦ CT Abdomen and Pelvis with (CPT® 74177) ◦ CT Abdomen and Pelvis without and with contrast (CPT® 74178) ◦ MRI Abdomen without and with contrast (CPT® 74183) ◦ MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377) • CT with contrast of other involved or symptomatic areas
Unresectable disease or metastatic disease on chemotherapy in individuals with pancreatic cancer	Every 2 cycles of treatment (commonly every 6 to 8 weeks): • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with (CPT® 74177) or CT Abdomen and Pelvis without and with contrast (CPT® 74178) • CT with contrast of other involved or symptomatic areas
Unexplained elevated liver enzymes or inconclusive recent CT abnormality in individuals with pancreatic cancer	• MRI Abdomen without and with contrast (CPT® 74183) or MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377)
If complete surgical resection was initial therapy in individuals with pancreatic cancer	• See: **Pancreatic Cancer – Surveillance/Follow-up for surveillance imaging (ONC-13.5)**

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Indication	Medically Necessary Imaging Study
Inconclusive findings on conventional imaging in individuals with pancreatic cancer	• PET/CT (CPT® 78815)

Evidence Discussion

Cross-sectional imaging with contrast-enhanced CT of the chest, abdomen, and pelvis is supported for restaging following neoadjuvant therapy, establishment of a postoperative baseline, and evaluation of suspected recurrence due to the high likelihood of residual, recurrent, or metastatic disease. Pancreatic adenocarcinoma frequently demonstrates early progression and dissemination, and imaging is essential to reassess resectability and detect interval metastatic disease before proceeding with further therapy. This approach helps avoid nonbeneficial surgical intervention and guides appropriate treatment planning, particularly given that a minority of patients are candidates for curative resection (NCCN, 2026; Brennan et al., 2007).

For individuals with unresectable or metastatic disease receiving systemic therapy, interval imaging every two cycles (approximately every 6–8 weeks) is supported to evaluate treatment response and detect progression. Evidence indicates that pancreatic cancer has a high rate of progression during therapy, and serial imaging enables timely modification of treatment regimens when progression or lack of response is identified. This approach balances the benefits of early detection of progression with the risks of repeated radiation exposure and cost, which are justified in the context of aggressive disease biology and the need for dynamic treatment decision-making (NCCN, 2026).

MRI is supported as a complementary modality, particularly in the setting of indeterminate findings on CT or unexplained liver enzyme abnormalities. MRI offers improved soft tissue contrast and increased sensitivity for detection and characterization of liver lesions compared with CT, which is especially important given the liver is a common site of metastasis in pancreatic cancer. The selective use of MRI enhances diagnostic accuracy while minimizing unnecessary imaging utilization and associated resource burden (NCCN, 2026).

PET/CT is supported in cases with inconclusive conventional imaging or discordant clinical findings to evaluate for occult metastatic disease. Evidence demonstrates that PET/CT can improve detection of extra-pancreatic disease and may alter management decisions; however, it is not recommended as a primary modality due to limitations including false-positive findings from inflammatory processes and reduced sensitivity for small lesions (Pu et al., 2021). Restricting PET/CT to problem-solving scenarios balances its clinical benefit with potential harms such as additional radiation exposure,

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increased cost, and risk of overdiagnosis, supporting a tiered imaging strategy aligned with disease biology (NCCN, 2026; Pu et al., 2021).

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Pancreatic Cancer – Surveillance/Follow-up (ONC-13.5)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with pancreatic cancer (other than resected ampullary cancer)	Every 3 months for 2 years, then annually: • CT Chest with contrast (CPT® 71260) And ANY ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Individuals with resected ampullary cancer	Every 3 months for 2 years, then every 6 months for up to 5 years: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Measurable metastatic disease on maintenance therapy or being monitored off therapy in individuals with pancreatic cancer	Every 3 months for up to 5 years after completion of definitive treatment, then annually: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

Background and Supporting Information

Pancreatic adenocarcinoma is characterized by an aggressive clinical course, with high rates of recurrence even after curative-intent therapy. Both local recurrence and distant metastases are common following surgery or systemic therapy, reflecting the presence of micrometastatic disease at diagnosis in many individuals (NCCN, 2026).

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Evidence Discussion

Evidence supporting surveillance imaging in pancreatic cancer is limited, and recommendations are largely based on expert consensus rather than high-level data. NCCN noted that while recurrence is common, available observational data, including population-based analyses, have not demonstrated a clear survival benefit from routine surveillance imaging or earlier detection of recurrence. This supports a balanced approach to follow-up that incorporates imaging alongside clinical evaluation rather than reliance on imaging alone (NCCN, 2026).

Despite limited survival benefit, routine imaging with contrast-enhanced CT of the chest, abdomen, and pelvis is supported at defined intervals because it provides objective assessment of disease status and may inform management decisions, including eligibility for additional systemic therapy or clinical trials. Cross-sectional imaging is particularly important in the early post-treatment period when recurrence risk is highest, and establishing a consistent imaging modality allows for reliable longitudinal comparison (NCCN, 2026).

For individuals with measurable metastatic disease undergoing maintenance therapy or observation, serial imaging every 3 months is supported to monitor disease stability or progression. Pancreatic cancer is characterized by rapid progression, and timely detection of interval progression allows for modification of treatment strategies. However, ASCO and other expert groups emphasize that imaging should be integrated with clinical assessment, as frequent imaging may not always translate into meaningful changes in outcomes and may expose patients to cumulative radiation and increased healthcare costs (NCCN, 2026).

Surveillance recommendations for resected ampullary cancer similarly rely on consensus, with NCCN advising periodic imaging combined with clinical evaluation and tumor markers. Imaging intervals are more frequent in the first two years due to higher recurrence risk, followed by less frequent imaging thereafter. This approach aims to balance early detection of recurrence with the potential harms of overimaging, including incidental findings, patient anxiety, and unnecessary interventions (NCCN, 2026).

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Upper GI Cancers (ONC-14)

Guideline

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Hepatocellular Carcinoma (HCC) – General Considerations (ONC-14.1)

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Criteria

- A biopsy is not always required for the diagnosis of Hepatocellular carcinoma (HCC). A dedicated triple-phase CT or MRI is considered medically necessary. MRI with contrast is the test of choice for the evaluation of liver masses. It offers soft tissue contrast resolution superior to CT as well as the possibility of using two different contrast agents, one of which if more blood flow based and the other which also is blood flow based and demonstrates hepatobiliary function (Eovist). Classical imaging findings include:
  - arterial phase hyper-enhancement
  - venous phase washout appearance
  - capsule appearance
  - threshold growth
- For individuals who are high-risk for developing HCC (cirrhosis, chronic Hepatitis B or current or prior HCC), if the liver lesion is greater than 1cm with 2 classic enhancements on triple-phase CT or MRI, the diagnosis is confirmatory and biopsy is not needed.
- For lesions less than 1cm or with less than 2 classical enhancements or for any liver lesions in individuals who are not high-risk, a biopsy is needed for histological confirmation. PET/CT scan is considered not medically necessary for the diagnosis or staging of HCC.

Background and Supporting Information

Hepatocellular carcinoma (HCC) is the most common primary malignancy of the liver, accounting for the majority of liver cancers and typically arising in the setting of chronic liver disease or cirrhosis. Major etiologies include chronic hepatitis B and C infection, alcohol-related liver disease, and metabolic dysfunction-associated steatotic liver disease. Disease prognosis is influenced by both tumor burden and underlying liver function, often assessed using staging systems such as the Barcelona Clinic Liver Cancer (BCLC) classification (Mazza et al., 2024; NCCN, 2026).

Evidence Discussion

Noninvasive imaging-based diagnosis of hepatocellular carcinoma is supported by evidence demonstrating that multiphase CT and MRI can reliably identify the

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characteristic vascular profile of HCC, including arterial phase hyperenhancement and portal venous washout. In individuals with cirrhosis or chronic hepatitis B, these imaging findings have high specificity, allowing for diagnosis without biopsy. This approach reduces patient risk by avoiding invasive procedures and associated complications such as bleeding and tumor seeding, while also enabling more rapid initiation of treatment (NCCN, 2026).

The restriction of imaging-based diagnosis to high-risk populations is supported by differences in disease prevalence and diagnostic accuracy. In high-risk individuals, lesions meeting established imaging criteria have a very high likelihood of representing HCC, whereas in low-risk individuals or when imaging features are incomplete, the probability of alternative diagnoses increases. In these cases, biopsy is necessary to establish histologic confirmation and exclude other malignancies such as cholangiocarcinoma or mixed tumors, supporting a risk-adapted diagnostic strategy (NCCN, 2026).

MRI is a preferred modality in many cases due to its superior soft tissue contrast and ability to assess both vascular characteristics and hepatobiliary function using specialized contrast agents. This improves detection and characterization of smaller or indeterminate lesions compared with CT. However, CT remains an appropriate alternative due to its accessibility, speed, and cost advantages, reflecting a balance between diagnostic performance and resource utilization in clinical practice (NCCN, 2026).

Serum biomarkers such as alpha-fetoprotein (AFP) and advanced imaging modalities such as PET/CT have limited roles in primary diagnosis. AFP lacks sufficient sensitivity and specificity, with many early-stage tumors demonstrating normal values and elevations occurring in nonmalignant conditions. PET/CT has limited sensitivity for HCC, particularly in well-differentiated or small lesions, and is therefore not recommended for routine diagnosis or staging. Restricting the use of these modalities minimizes unnecessary testing, radiation exposure, and diagnostic uncertainty while emphasizing imaging modalities with established diagnostic accuracy (Mazza et al., 2024; NCCN, 2026).

Health Equity Considerations

Hepatocellular carcinoma (HCC) disproportionately affects individuals from historically marginalized populations, with persistent inequities observed across incidence, stage at diagnosis, treatment receipt, and survival. In the United States, American Indian/Alaska Native, Hispanic, Black, and Asian/Pacific Islander populations experience higher HCC incidence compared with non-Hispanic White individuals, reflecting unequal distributions of chronic hepatitis B and C, metabolic dysfunction–associated steatotic liver disease, alcohol-related liver disease, and structural determinants of health (Flores et al., 2021; Guo et al., 2021; Jing et al., 2026; Rezaee-Zavareh et al., 2024).

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Socioeconomic disadvantage, including lower income, limited educational attainment, and underinsurance, is independently associated with later-stage presentation and worse survival across racial and ethnic groups, with Black individuals consistently experiencing the highest likelihood of advanced disease and lowest survival even after adjustment for stage and treatment (Flores et al., 2021; Ong et al., 2025; Zheng et al., 2026). Geographic factors, such as residence in rural or nonmetropolitan areas and greater distance from specialty centers, further exacerbate disparities through reduced access to surveillance, multidisciplinary care, and curative therapies (Nephew et al., 2026; Zheng et al., 2026).

Inequities in HCC outcomes are strongly influenced by barriers to timely surveillance, diagnostic imaging, and treatment navigation. Racial and ethnic minorities and those with low socioeconomic status are less likely to receive guideline-concordant HCC surveillance and more likely to report challenges related to transportation, health literacy, medical mistrust, time burden, and financial strain, all of which contribute to delayed diagnosis and lower receipt of curative therapy (Schoenberger et al., 2024; Patel et al., 2025; Ong et al., 2025). Intersectional analyses demonstrate that compounded social risk, such as being uninsured, publicly insured, socially isolated, or living in highly deprived or geographically distant communities, is associated with markedly lower rates of early-stage diagnosis and curative treatment and substantially higher mortality (Nephew et al., 2026). Health equity–informed imaging and care pathways that account for these structural and social barriers, promote timely access to diagnostic evaluation, and support navigation to appropriate treatment are essential to reducing disparities and improving outcomes for individuals at highest risk of poor HCC prognosis (Guo et al., 2021; Zheng et al., 2026).

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Hepatocellular Carcinoma (HCC) – Suspected/Diagnosis (ONC-14.2)

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- See: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)** in the Abdomen Imaging Guidelines.
- See: **Liver Lesion Characterization (AB-29.1)** in the Abdomen Imaging Guidelines.

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Hepatocellular Carcinoma (HCC) – Initial Work-up/Staging (ONC-14.3)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with HCC	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) And ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen without and with contrast (CPT® 74170) • CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • Bone scan (CPT® 78306) (for skeletal symptoms)
Inconclusive conventional imaging in individuals with HCC	• PET/CT (CPT® 78815)

Background and Supporting Information

Hepatocellular carcinoma (HCC) is a primary liver malignancy that most commonly arises in the setting of chronic liver disease and cirrhosis. Disease progression is influenced by tumor burden, vascular invasion, and hepatic functional reserve, and staging incorporates both oncologic and hepatic parameters. HCC demonstrates a propensity for intrahepatic spread and extrahepatic metastases, necessitating comprehensive imaging at diagnosis to accurately determine disease extent and guide treatment decisions (NCCN, 2026; Arora et al., 2021).

The identification of extrahepatic disease has significant implications for treatment selection, as the presence of metastatic disease generally precludes curative therapies such as resection or transplantation. Imaging strategies are therefore designed to comprehensively evaluate both hepatic and extrahepatic disease to optimize staging accuracy and inform multidisciplinary management (NCCN, 2026).

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Evidence Discussion

Initial imaging for HCC is supported by evidence demonstrating that multiphasic CT or MRI provides the most accurate assessment of intrahepatic tumor burden, including lesion number, size, vascular invasion, and overall extent of disease. These modalities are preferred over ultrasound due to their higher sensitivity and ability to characterize tumor vascularity and detect clinically significant disease, which is essential for staging and treatment planning (NCCN, 2026).

Comprehensive staging also requires evaluation for extrahepatic metastases, as HCC frequently spreads beyond the liver. Imaging of the chest is supported due to the lungs being the most common site of metastatic disease, while additional metastatic sites include bone, lymph nodes, adrenal glands, and peritoneum. Cross-sectional imaging of the abdomen and pelvis further evaluates these regions and improves detection of metastatic disease, which may significantly alter management and prognosis (Arora et al., 2021; NCCN, 2026).

Bone imaging is supported in individuals with skeletal symptoms or suspicious findings because osseous metastases occur in a significant proportion of patients with advanced disease. Targeted imaging in this setting improves detection of clinically relevant metastases and can guide symptom management and therapeutic decision-making. This selective approach balances the benefit of detecting metastatic disease with avoidance of unnecessary imaging in asymptomatic individuals (Arora et al., 2021; NCCN, 2026).

PET/CT is a problem-solving tool for inconclusive findings on conventional imaging. Evidence indicates that PET/CT may detect additional extrahepatic metastases and influence staging, but it has limited sensitivity for primary hepatic lesions and variable specificity. Therefore, it is not recommended as a primary staging modality but may provide incremental value in indeterminate cases. This selective use minimizes unnecessary radiation exposure and cost while leveraging its benefit in clarifying equivocal findings (Arora et al., 2021; NCCN, 2026).

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Hepatocellular Carcinoma (HCC) – Restaging/Recurrence (ONC-14.4)

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Criteria

Indication	Medically Necessary Imaging Study
ONE of the following in individuals with HCC: • After initial therapy • For suspected recurrence or new liver lesions • Individuals receiving systemic therapy (every 2 cycles)	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) And ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen without and with contrast (CPT® 74170) • CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Inconclusive conventional imaging in individuals with HCC	• PET/CT (CPT® 78815)
Hepatocellular Carcinoma treated with local therapy (ablation, embolization)	See: **Liver Metastases (ONC-31.2)** for imaging studies prior to and post-procedure
Hepatocellular Carcinoma awaiting liver transplant	See: **Liver Transplant, Pre-Transplant (AB-42.1)** in the Abdomen Imaging Guidelines

Evidence Discussion

Cross-sectional imaging is essential for restaging and evaluation of hepatocellular carcinoma following therapy, as it provides accurate assessment of treatment response, detection of residual disease, and identification of recurrence. Multiphase CT or MRI of the abdomen and pelvis are supported because they reliably evaluate intranodular arterial vascularity, which is a critical imaging feature distinguishing viable tumor from

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post-treatment changes. These modalities also allow assessment of tumor burden, vascular invasion, and intrahepatic progression, supporting their use after initial therapy and for suspected recurrence or new liver lesions (NCCN, 2026).

Imaging of the chest is supported in conjunction with abdominal imaging because of the risk of extrahepatic disease, particularly given that HCC may present with or develop metastatic disease in sites such as the lungs, lymph nodes, and bone. Evidence demonstrates that extrahepatic metastases may be present in a significant proportion of patients at diagnosis and can also develop during treatment or surveillance. Comprehensive imaging of the chest, abdomen, and pelvis enables accurate restaging, informs prognosis, and helps guide decisions regarding continued systemic therapy or transition to alternative treatment approaches (Arora et al., 2021; NCCN, 2026).

For individuals receiving systemic therapy, interval imaging is supported to monitor treatment response and detect disease progression. HCC demonstrates variable treatment response and may develop new intrahepatic or extrahepatic lesions over time. Serial imaging allows timely identification of progression or lack of response, enabling clinicians to modify therapy accordingly. While repeated imaging carries risks such as cumulative radiation exposure and cost, these are justified by the aggressive disease course and the need for ongoing reassessment to optimize treatment outcomes (Arora et al., 2021; NCCN, 2026).

PET/CT is a problem-solving modality in cases of inconclusive findings on conventional imaging. Evidence indicates that PET/CT has limited sensitivity for detecting primary hepatic lesions but can identify additional extrahepatic metastases and provide complementary metabolic information. Its selective use in indeterminate scenarios improves diagnostic confidence while minimizing unnecessary radiation exposure, false-negative interpretation of liver disease, and undue resource utilization. This targeted approach aligns with its strengths and limitations in HCC imaging (Arora et al., 2021; NCCN, 2026).

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Hepatocellular Carcinoma (HCC) – Surveillance/Follow-up (ONC-14.5)

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Criteria

Indication	Medically Necessary Imaging Study
Hepatocellular Carcinoma: • Treated with surgical resection • Treated with embolization • Being monitored off therapy	Every 3 months for 2 years, then every 6 months until year 5: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) And ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen without and with contrast (CPT® 74170) • CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast
Hepatocellular Carcinoma treated with liver transplant	• See: **Liver Transplant, Post-transplant Imaging (AB-42.3)** in the Abdomen Imaging Guidelines

Background and Supporting Information

HCC is associated with a high risk of recurrence following both curative and non-curative therapies, with recurrence rates approaching 60–70% within five years after resection or ablation. Recurrence may occur early, often due to micrometastatic disease or aggressive tumor biology, or later due to de novo tumor development in the setting of chronic liver disease (Celotti et al., 2025).

Tumor biology plays a significant role in recurrence risk and long-term outcomes. Microvascular invasion (MVI), tumor size, differentiation, and presence of satellite nodules are strongly associated with increased recurrence risk and decreased overall survival. MVI in particular reflects aggressive disease and is a key determinant of both intrahepatic spread and distant metastasis (Celotti et al., 2025; Hwang et al., 2023). Surveillance imaging aims to detect recurrent or progressive disease early, both within

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the liver and at extrahepatic sites. Common metastatic sites include the lungs, bone, lymph nodes, and adrenal glands, and imaging must therefore include both hepatic and extrahepatic evaluation (Arora et al., 2021; NCCN, 2026).

Evidence Discussion

Surveillance imaging with multiphasic CT or MRI is supported due to its ability to detect recurrent or residual tumor based on characteristic arterial vascularity patterns. HCC recurrence is strongly associated with tumor vascularity, and cross-sectional imaging allows reliable assessment of arterial phase enhancement and washout patterns that distinguish viable tumor from post-treatment changes. This is particularly important in the early post-treatment period when recurrence risk is highest (NCCN, 2026).

Frequent surveillance imaging at defined intervals is supported by the high rate of recurrence after treatment, with studies demonstrating that recurrence occurs in the majority of patients within 5 years. Early recurrence, often related to micrometastatic disease or aggressive tumor features such as microvascular invasion, may occur within 2 years, justifying more intensive imaging during this period. Continued imaging beyond 2 years is supported by the risk of late recurrence, including de novo tumors in cirrhotic liver (Celotti et al., 2025).

Imaging of the chest in addition to the abdomen and pelvis is supported because of the risk of extrahepatic metastases. HCC spreads through hematogenous and lymphatic pathways, most commonly to the lungs and bone, and detection of these metastases significantly impacts staging, prognosis, and treatment decisions. Comprehensive imaging improves detection of clinically relevant disease beyond the liver and contributes to appropriate therapeutic planning (Arora et al., 2021).

While surveillance imaging provides important clinical information, it also carries potential harms, including radiation exposure, cost, and detection of incidental findings. However, given the aggressive nature of HCC, high recurrence rates, and the prognostic impact of early detection, the benefits of surveillance imaging outweigh these risks in appropriately selected individuals. A structured surveillance strategy using CT or MRI balances the need for early detection with minimization of unnecessary imaging while supporting timely intervention for recurrent disease (NCCN, 2026; Hwang et al., 2023).

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Gallbladder and Biliary Tumors – Initial Work-up/Staging (ONC-14.6)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with gallbladder and biliary tumors	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) And ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen without and with contrast (CPT® 74170) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • MRCP with 3D rendering (CPT® 74183 and CPT® 76376 or CPT® 76377)
Inconclusive liver findings on CT (if MRI not already performed) with gallbladder and biliary tumors	MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Inconclusive findings on MRI Abdomen with gallbladder and biliary tumors	• PET/CT (CPT® 78815)

Background and Supporting Information

Gallbladder and biliary tract cancers are a group of aggressive malignancies that include gallbladder carcinoma and cholangiocarcinoma. These tumors often present with nonspecific symptoms such as abdominal pain, jaundice, and weight loss, and are frequently diagnosed at advanced stages due to delayed clinical presentation and limitations of early detection (Furlan et al., 2008; Lamarca et al., 2019).

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Tumor spread commonly involves direct invasion into the liver or adjacent organs, lymphatic dissemination to regional nodes, and distant metastases via hematogenous or peritoneal pathways. Accurate staging requires evaluation of the chest, abdomen, and pelvis to detect nodal and distant disease, which significantly impacts resectability and prognosis (Furlan et al., 2008; NCCN, 2026).

Evidence Discussion

High-quality contrast-enhanced cross-sectional imaging of the chest, abdomen, and pelvis is supported for initial work-up and staging because it provides comprehensive evaluation of tumor extent and disease spread. CT and MRI are effective for assessing tumor penetration through the gallbladder wall or bile ducts, identifying invasion of adjacent organs or major vascular structures, and detecting lymph node and distant metastases. These imaging capabilities are essential for determining stage and guiding treatment decisions, including resectability (Furlan et al., 2008; NCCN, 2026).

CT is widely used due to its ability to characterize local disease extent and evaluate metastatic spread with high accuracy, including detection of hepatic invasion, vascular involvement, and nodal disease. MRI and MRCP provide additional benefit in detailed evaluation of the biliary tree and soft tissue contrast, which can improve detection of bile duct involvement and assist with surgical planning. Together, these modalities complement each other in characterizing both local and systemic disease burden (Furlan et al., 2008).

PET/CT is a problem-solving tool in cases of inconclusive findings on CT or MRI. Evidence demonstrates that PET/CT has high sensitivity for detecting metastatic disease, including lymph node and distant metastases, and can alter management in a meaningful proportion of patients by identifying previously occult disease. However, its lower specificity due to false-positive uptake from inflammation or biliary infection limits its routine use in initial diagnosis and supports its selective application when conventional imaging is equivocal (Lamarca et al., 2019).

The benefits of comprehensive imaging include improved staging accuracy, appropriate treatment selection, and avoidance of non-beneficial surgical interventions in patients with advanced disease. Potential harms include radiation exposure, contrast-related risks, and false-positive findings, particularly with PET/CT, which may lead to additional testing. However, given the aggressive nature of gallbladder and biliary tumors and the importance of accurate staging, the benefits of cross-sectional imaging and selective PET/CT use outweigh these risks when applied in accordance with clinical indications (Furlan et al., 2008; Lamarca et al., 2019; NCCN, 2026).

Health Equity Considerations

Gallbladder and biliary tract cancers demonstrate substantial and persistent inequities across geographic regions, socioeconomic strata, and demographic groups. Global

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analyses consistently show that absolute incidence, mortality, and disability-adjusted life years (DALYs) have risen markedly since 1990, despite declining age-standardized rates, reflecting the combined effects of population growth, population aging, and uneven epidemiologic progress (Bao et al., 2025; Dai et al., 2025; Xie et al., 2025). Countries within the so-called "gallbladder cancer belt," including parts of South America and Asia, continue to experience disproportionate burden related to environmental exposures, gallstone prevalence, infectious risks, and structural barriers to early detection (Bao et al., 2025; Xie et al., 2025). Although high Socio-Demographic Index (SDI) regions often report higher incidence due in part to stronger diagnostic capacity, low- and low-middle SDI regions increasingly bear rising mortality and DALY burdens, reflecting delayed diagnosis, limited access to advanced imaging, and constrained oncologic resources (Bao et al., 2025; Dai et al., 2025).

Equity gaps are further shaped by gender and health system factors. While females historically experienced higher disease burden, recent data demonstrate a reversal in incidence trends in many higher-SDI settings, with males increasingly affected, underscoring the need for sex-specific prevention and diagnostic strategies (Dai et al., 2025; Xie et al., 2025). Health workforce analyses reveal paradoxical associations in which higher densities of conventional healthcare personnel correlate with higher reported disease burden, likely reflecting improved case detection rather than worse outcomes, whereas settings with limited diagnostic infrastructure may systematically underestimate disease prevalence (Dai et al., 2025). Together, these findings highlight the importance of equitable access to high-quality diagnostic imaging and surveillance, particularly for older adults and populations in resource-limited settings, to ensure timely diagnosis, appropriate staging, and consistent application of oncology imaging guidelines across diverse populations (Bao et al., 2025; Dai et al., 2025; Xie et al., 2025).

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Gallbladder and Biliary Tumors – Restaging/Recurrence (ONC-14.7)

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Criteria

Indication	Medically Necessary Imaging Study
ANY of the following in individuals with gallbladder and biliary tumors: • After initial therapy • For suspected recurrence or new liver lesions • Individuals receiving systemic chemotherapy (every 2 cycles)	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) And ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Inconclusive liver findings on CT (if MRI not already performed for restaging) in individuals with gallbladder and biliary tumors	• MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Inconclusive findings on MRI Abdomen in individuals with gallbladder and biliary tumors	• PET/CT (CPT® 78815)

Evidence Discussion

Contrast-enhanced cross-sectional imaging of the chest, abdomen, and pelvis with CT or MRI is supported for restaging and detection of recurrence in gallbladder and biliary tumors due to the high likelihood of disease progression and metastatic spread. Cross-sectional imaging enables evaluation of residual or recurrent tumor at the primary site, including assessment of tumor infiltration through the gallbladder wall or bile ducts, as well as identification of hepatic invasion, vascular involvement, and direct extension into adjacent structures. These imaging capabilities are essential for determining disease status following therapy and guiding further management decisions (Furlan et al., 2008; NCCN, 2026).

Imaging of the chest in conjunction with abdominal and pelvic imaging is supported because biliary tract malignancies frequently recur or progress with nodal and distant

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metastases. Patterns of spread include lymphatic dissemination to regional nodes and hematogenous or peritoneal metastases, including liver, peritoneum, and distant organs. Comprehensive imaging allows detection of these sites of disease and supports accurate reassessment of disease burden during surveillance or systemic therapy, including at defined intervals such as during chemotherapy (Furlan et al., 2008; NCCN, 2026).

MRI is a complementary modality when CT findings are inconclusive, particularly for characterization of liver lesions or biliary involvement. MRI provides improved soft tissue contrast and enhanced evaluation of the hepatobiliary system, which may better delineate recurrent tumor from post-treatment changes or indeterminate hepatic findings. This improves diagnostic confidence in distinguishing recurrence from benign or treatment-related abnormalities (Furlan et al., 2008).

PET/CT is a problem-solving tool when CT or MRI findings are inconclusive. Evidence demonstrates that PET/CT has high sensitivity for detection of recurrent disease and distant metastases and can identify occult sites of disease that may alter patient management in a clinically meaningful proportion of cases. However, its use must be balanced against limitations in specificity, as false-positive uptake may occur in inflammatory or infectious biliary conditions, including post-treatment changes or gallbladder inflammation. Therefore, PET/CT is most appropriately utilized when standard cross-sectional imaging is equivocal, where the potential benefit of clarifying disease status outweighs the risk of false-positive findings (Lamarca et al., 2019).

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Gallbladder and Biliary Tumors – Surveillance/Follow-up (ONC-14.8)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with gallbladder or biliary tumors	Every 3 months for 2 years, and then every 6 months up to year 5: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) And ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen without and with contrast (CPT® 74170) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Biliary carcinoma treated with liver transplant	See: **Liver Transplant, Post-transplant Imaging (AB-42.3)** in the Abdomen Imaging Guidelines

Background and Supporting Information

Gallbladder and biliary tract cancers are associated with a high risk of recurrence following initial therapy, particularly after surgical resection. Recurrence may occur locally within the hepatobiliary system or at distant sites, and is influenced by tumor stage, lymph node involvement, and margin status. The majority of recurrences occur within the first two years following treatment, reflecting the aggressive biology and propensity for early dissemination characteristic of these malignancies (NCCN, 2026).

Evidence Discussion

Evidence supporting surveillance imaging in gallbladder and biliary tumors is limited, and current recommendations are based primarily on consensus rather than prospective trials. NCCN noted that there are no definitive data establishing an optimal imaging schedule following resection. However, surveillance imaging is supported due to the

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high risk of recurrence and the potential for imaging findings to influence subsequent management decisions (NCCN, 2026).

The recommendation for imaging every 3 months during the first 2 years and then every 6 months up to 5 years aligns with known patterns of disease recurrence. Recurrence most commonly occurs within the first 2 years after treatment, supporting more intensive imaging during this period. Continued imaging beyond 2 years addresses the risk of later recurrence and allows for ongoing assessment of disease status over time (NCCN, 2026).

Cross-sectional imaging with CT or MRI is supported for surveillance because of its ability to evaluate both local and distant recurrence. Imaging of the chest allows detection of pulmonary metastases, while abdominal and pelvic imaging assesses the liver, biliary system, lymph nodes, and peritoneum. This comprehensive approach improves detection of clinically relevant recurrence that may alter treatment strategies, including systemic therapy or palliative interventions (NCCN, 2026).

While surveillance imaging provides important clinical benefits, potential harms include cumulative radiation exposure, contrast-related risks, cost, and detection of incidental findings that may lead to unnecessary additional testing. Given the lack of strong evidence for survival benefit, imaging should be individualized based on clinical context and patient factors. However, due to the aggressive nature of biliary malignancies and high recurrence rates, periodic imaging remains justified to support timely detection of recurrence and appropriate clinical decision-making (NCCN, 2026).

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Gastric Cancer – Initial Work-up/Staging (ONC-14.9)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with gastric cancer	• CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Gastric cancer T2 or higher	In addition to the above CTs: • PET/CT (CPT® 78815)

Background and Supporting Information

Gastric cancer is a high-incidence malignancy worldwide with significant mortality, often presenting at advanced stages where lymph node and distant metastases are common. Accurate initial staging is essential to guide treatment decisions, including selection of surgical candidates and use of perioperative systemic therapy (NCCN, 2026; Dassen et al., 2009).

Evidence Discussion

Contrast-enhanced CT of the chest, abdomen, and pelvis is the primary imaging modality for initial staging because it provides comprehensive anatomic assessment of tumor extent, nodal disease, and distant metastases. NCCN recommends CT as standard in the initial work-up, reflecting its widespread availability and ability to guide treatment selection, including identification of resectable versus metastatic disease (NCCN, 2026). However, CT has limitations, including moderate sensitivity and specificity for lymph node metastases due to reliance on nodal size criteria and difficulty distinguishing malignant from inflammatory nodes (Dassen et al., 2009).

PET/CT is an adjunct modality in individuals with ≥T2 disease because it provides complementary metabolic information that may improve staging accuracy. Evidence demonstrates that FDG uptake in primary tumors and lymph nodes is associated with more advanced pathological stages (III/IV), suggesting a potential role in identifying higher-risk disease not fully characterized by CT alone (Kudou et al., 2018). This additional information may influence treatment planning, including selection for neoadjuvant therapy.

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However, PET/CT has important limitations that support its selective rather than routine use. FDG-PET alone has limited sensitivity for detecting primary gastric tumors, especially early-stage lesions and certain histologic subtypes such as diffuse or signet ring cell carcinoma (Dassen et al., 2009). It also has reduced sensitivity for small lymph node metastases due to spatial resolution constraints, although specificity is relatively high. These limitations explain why PET/CT is not an adequate standalone staging modality and must be used in conjunction with CT.

The combined use of CT and PET/CT reflects a risk-adapted imaging strategy that balances benefits and harms. The addition of PET/CT may improve detection of advanced disease and reduce understaging, but it introduces risks including false-positive findings, additional radiation exposure, and increased cost. Therefore, restricting PET/CT to patients with ≥T2 disease optimizes diagnostic yield while minimizing unnecessary imaging, aligning with evidence that PET/CT provides incremental value primarily in more advanced disease settings (NCCN, 2026; Dassen et al., 2009; Kudou et al., 2018).

Health Equity Considerations

Gastric cancer in the United States demonstrates marked and persistent inequities by race, ethnicity, nativity, geography, and socioeconomic status, despite overall declines in national incidence and mortality. Minoritized populations, including Asian, Hispanic/Latino, Black, American Indian/Alaska Native, and certain immigrant communities, experience substantially higher incidence and mortality than non-Hispanic White populations, with elevated risk observed in nearly all U.S. counties and particularly pronounced in states and regions with larger immigrant and lower-income populations (GBD US Health Disparities Collaborators, 2023; Rabkin, 2023). These disparities largely reflect structural and social determinants rather than biologic differences alone, including higher prevalence of Helicobacter pylori infection, early-life exposure in high-incidence countries, household crowding, limited access to nutritious foods, and barriers to timely specialty care and diagnostic evaluation (Gonzalez-Pons et al., 2022; Kim et al., 2026). Socioeconomic position, especially income and educational attainment, has been shown to mediate a substantial proportion of racial and ethnic differences in gastric cancer burden, underscoring the role of modifiable structural factors in shaping outcomes (Kim et al., 2026). Importantly, heterogeneity within aggregated racial and ethnic categories (e.g., among Asian or Hispanic subgroups) may obscure groups at particularly high risk, such as Korean, Japanese, Vietnamese, and Puerto Rican populations (Gonzalez-Pons et al., 2022; Hyun & Cho, 2024).

Health equity considerations are especially relevant to imaging and diagnostic pathways, as delayed presentation and late-stage diagnosis are more common among high-risk and underserved populations, contributing to poorer survival (GBD US Health Disparities Collaborators, 2023; Rabkin, 2023). Structural barriers, including lack of insurance, limited access to high-volume cancer centers, language discordance, and

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gaps in guideline-concordant evaluation, may reduce timely use of endoscopy and cross-sectional imaging for diagnosis and staging (Hyun & Cho, 2024; Kim et al., 2026). While population-based gastric cancer screening has reduced mortality in high-incidence countries, there is no standardized U.S. screening strategy for high-risk groups, raising concerns about underdiagnosis and inequitable access to early detection (Hyun & Cho, 2024; Rabkin, 2023). Equity-informed imaging practices should therefore emphasize risk-based clinical awareness, culturally and linguistically appropriate care, and timely diagnostic imaging for symptomatic patients or those with known risk factors, with the goal of reducing disparities in stage at diagnosis and outcomes across historically marginalized populations (Gonzalez-Pons et al., 2022; Kim et al., 2026).

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Gastric Cancer – Restaging/Recurrence (ONC-14.10)

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Criteria

Indication	Medically Necessary Imaging Study
• After completion of primary therapy (to include chemotherapy and/or chemoradiotherapy), prior to surgery in individuals with gastric cancer • After completion of chemoradiation therapy with definitive intent (i.e., no metastatic disease and no anticipated resection surgery) in individuals with gastric cancer • For suspected recurrence in individuals with gastric cancer	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177)
Monitoring response to chemotherapy (every 2 cycles, ~every 6-8 weeks) for: • Unresected primary disease in individuals with gastric cancer • Metastatic disease in individuals with gastric cancer	• CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Chest with contrast (CPT® 71260)
New liver lesion(s) and primary site controlled in individuals with gastric cancer	• CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183)

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Indication	Medically Necessary Imaging Study
EITHER of the following in individuals with gastric cancer: • Inconclusive findings on conventional imaging • Restaging of individuals with unresectable disease who cannot undergo CT with contrast due to renal insufficiency or contrast allergy	• PET/CT (CPT® 78815)

Evidence Discussion

Contrast-enhanced CT of the chest, abdomen, and pelvis is supported for restaging after completion of therapy, prior to surgery, and for suspected recurrence because it provides comprehensive evaluation of locoregional disease and distant metastases. NCCN recommended cross-sectional imaging in these settings to assess treatment response, detect residual or recurrent disease, and guide further management decisions, including eligibility for surgical resection or transition to systemic therapy (NCCN, 2026). CT imaging allows consistent longitudinal comparison and is widely available, though it remains limited by moderate sensitivity in detecting small volume or early recurrent disease.

Serial imaging with CT is supported for monitoring response to chemotherapy in both unresected primary and metastatic disease. NCCN indicates that CT is used for response assessment during systemic therapy because it provides objective measurement of tumor burden and can identify new or progressive disease. Timely interval imaging allows clinicians to modify treatment strategies in response to progression, balancing the benefits of early detection of non-response with the risks of cumulative radiation exposure and cost (NCCN, 2026).

Dedicated abdominal imaging with multiphasic CT or MRI is supported for evaluation of new liver lesions, particularly when the primary site is controlled. These modalities provide improved characterization of hepatic lesions and help distinguish metastatic disease from benign or treatment-related findings. This targeted approach improves diagnostic specificity and ensures appropriate staging and management in cases where liver metastasis would significantly alter prognosis and treatment decisions (NCCN, 2026).

PET/CT is an adjunct modality in cases of inconclusive findings on conventional imaging or when CT cannot be performed due to contrast allergy or renal insufficiency. NCCN notes that PET/CT can provide additional metabolic information that may help clarify indeterminate findings and detect occult metastatic disease. However, PET/CT is

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not routinely required for all patients due to limitations in sensitivity for small or low-metabolic lesions and potential for false-positive findings, supporting its selective use when conventional imaging is insufficient (NCCN, 2026).

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Gastric Cancer – Surveillance/Follow-up (ONC-14.11)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I (treated with resection alone) gastic cancer	• No routine imaging unless clinical signs/ symptoms of recurrence
ANY of the following: • Stage I gastic cancer treated with systemic therapy • Stages II-III gastic cancer • Stage IV gastic cancer - Metastatic disease with no measurable disease post definitive treatment	Every 6 months for 2 years, and then annually for 3 more years: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) and CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ In individuals who cannot undergo CT with contrast due to renal insufficiency or contrast allergy, MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) are considered the medically necessary substitute.
Measurable metastatic disease on maintenance therapy or being monitored off therapy in individuals with gastric cancer	Every 3 months for up to 5 years after completion of active treatment: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)

Background and Supporting Information

Gastric cancer demonstrates variable risk of recurrence based on initial stage and treatment approach, with higher-stage disease associated with increased likelihood of both locoregional and distant relapse. Follow-up strategies are therefore risk-adapted, with less intensive evaluation for early-stage disease treated definitively and more structured surveillance for individuals with higher-stage or metastatic disease (NCCN, 2026).

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Surveillance intensity reflects patterns of recurrence, which are most common within the first 2–3 years after treatment and decrease thereafter. In contrast, individuals with low-risk disease treated with resection alone have a lower likelihood of recurrence, and routine imaging may not provide additional clinical benefit in the absence of symptoms (NCCN, 2026).

Evidence Discussion

Routine imaging is not supported for individuals with stage I gastric cancer treated with resection alone in the absence of symptoms, reflecting the relatively low risk of recurrence in this population. NCCN recommended that follow-up in these individuals rely primarily on clinical evaluation, with imaging reserved for cases with concerning signs or symptoms. This approach minimizes unnecessary radiation exposure, cost, and downstream testing without compromising outcomes in low-risk patients (NCCN, 2026).

For individuals with higher-risk disease, including stage I treated with systemic therapy, stages II–III disease, and stage IV disease after definitive treatment, periodic surveillance imaging with CT of the chest, abdomen, and pelvis is supported. NCCN recommends imaging every 6 months for the first 2 years, followed by annual imaging up to 3 years, aligning with the higher likelihood of recurrence during the early post-treatment period. This structured approach enables earlier detection of recurrent disease that may be amenable to additional therapy, while reducing imaging frequency as recurrence risk declines over time (NCCN, 2026).

For individuals with measurable metastatic disease on maintenance therapy or observation, more frequent imaging is supported due to the ongoing risk of disease progression. NCCN supports imaging every 3 months in this setting to monitor disease stability or progression and guide treatment modifications. This interval balances the need for timely detection of progression with the potential harms of repeated imaging, including radiation exposure and cost, which are justified by the clinical need for close monitoring in advanced disease (NCCN, 2026).

MRI is an alternative to CT in individuals who cannot receive iodinated contrast due to renal insufficiency or allergy, ensuring continuity of surveillance imaging while avoiding contrast-related risks. Overall, a risk-adapted surveillance strategy ranging from no routine imaging in low-risk individuals to structured and frequent imaging in higher-risk and metastatic disease optimizes detection of clinically meaningful recurrence while minimizing unnecessary imaging and associated harms (NCCN, 2026).

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Neuroendocrine Cancers and Adrenal Tumors (ONC-15)

Guideline

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Gastrointestinal/Pancreatic Neuroendocrine Cancers – Initial Work-up/Staging (ONC-15.3)
Gastrointestinal/Pancreatic Neuroendocrine Cancers – Restaging/Recurrence (ONC-15.4)
Gastrointestinal/Pancreatic Neuroendocrine Cancers – Surveillance (ONC-15.5)
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General Considerations (ONC-15.1)

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Criteria

This guideline includes low-grade or well-differentiated carcinoid and endocrine tumors of the lung, thymus, pancreas, gastrointestinal tract, or unknown primary site; including insulinoma, glucagonoma, VIPoma, gastrinoma, somatostatinoma, and others, as well as catecholamine-secreting tumors of the adrenal gland such as pheochromocytoma, paraganglioma, adrenocortical carcinoma, and others.

- For poorly-differentiated or high-grade small cell or large cell neuroendocrine tumors arising outside the lung or from an unknown primary site, see: **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)**.
- For poorly-differentiated or high-grade neuroendocrine tumors of the lung, see: **Small Cell Lung Cancer (ONC-7)**.
- Neuroblastoma, ganglioneuroblastoma, and ganglioneuroma occurring in adults should be imaged according to **Neuroblastoma (PEDONC-6)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Many are associated with Multiple Endocrine Neoplasia (MEN) familial syndromes.
  – See: **Multiple Endocrine Neoplasias (MEN) (PEDONC-2.8)** in the Pediatric and Special Populations Oncology Imaging Guidelines for screening recommendations.
- Somatostatin receptor (SSR) based imaging is more sensitive and specific for evaluation of well-differentiated neuroendocrine tumors and may be performed using ^{111}In DTPA Octreotide scintigraphy or PET/CT scan with SSR radiotracers (such as ^{68}Ga–DOTATATE, ^{68}Ga-DOTATOC, or ^{64}Cu-DOTATATE). This study is not part of evaluation of poorly-differentiated or high-grade neuroendocrine tumors, which are imaged according to: **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)**.
- If dotatate PET/CT is medically necessary but not available, octreotide scan (any one of the following planar imaging codes: CPT® 78801, 78802, 78804 **AND** any one of the following SPECT/SPECT-CT codes: CPT® 78803, 78830, 78831, 78832) may be substituted for dotatate PET.

Background and Supporting Information

Neuroendocrine neoplasms (NENs) represent a heterogeneous group of tumors arising from neuroendocrine cells throughout the body, with variability in primary site, biologic behavior, grade, differentiation, and functional status. Well-differentiated neuroendocrine tumors (NETs) are generally distinct from poorly differentiated neuroendocrine

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carcinomas (NECs) in both prognosis and imaging characteristics, necessitating separate diagnostic and management strategies (Zhang & Kunz, 2022; NCCN, 2026).

Tumor classification and staging are based on tumor differentiation, mitotic rate, and Ki-67 proliferative index, with well-differentiated tumors stratified into grades that correlate with tumor aggressiveness and prognosis. Higher grade and proliferative index are associated with more aggressive disease behavior and worse outcomes, supporting the need for appropriate imaging to guide staging and treatment planning (Zhang & Kunz, 2022).

Somatostatin receptor (SSTR) expression is a defining feature of most well-differentiated NETs, with approximately 80% demonstrating receptor expression. This biologic characteristic allows for targeted functional imaging using radiolabeled somatostatin analogs, which has become central to staging and disease assessment (Zhang & Kunz, 2022; NCCN, 2026).

Evidence Discussion

SSTR-based imaging is a highly sensitive and specific modality for evaluation of well-differentiated neuroendocrine tumors. Approximately 80% of these tumors express somatostatin receptors, enabling effective visualization with SSTR-targeted radiotracers such as Ga-DOTATATE and Cu-DOTATATE. This functional imaging provides whole-body assessment of disease burden and can detect lesions not identified on conventional imaging, improving staging accuracy and guiding treatment selection (Zhang & Kunz, 2022; NCCN, 2026).

The combination of functional imaging with anatomic imaging (CT or MRI) is supported due to their complementary roles. Anatomic imaging provides detailed visualization of tumor size, location, and structural involvement, while SSTR-based imaging identifies receptor-positive disease and occult metastases. This dual-modality approach improves diagnostic confidence and facilitates comprehensive disease characterization, which is essential for appropriate staging and management (Zhang & Kunz, 2022; NCCN, 2026).

SSTR-based imaging is not recommended for poorly differentiated or high-grade neuroendocrine tumors because these tumors often lack somatostatin receptor expression and instead demonstrate increased metabolic activity detectable on FDG-PET or other imaging modalities. This distinction supports separate imaging pathways based on tumor differentiation, ensuring that imaging strategies align with tumor biology and avoiding reduced sensitivity in high-grade disease (Zhang & Kunz, 2022).

When SSTR PET/CT is not available, octreotide scintigraphy remains an acceptable alternative, though it has lower spatial resolution and sensitivity compared with newer PET-based techniques. The use of this modality supports continued access to functional imaging while acknowledging potential limitations, including reduced lesion detectability and longer imaging time. Overall, the evidence supports a biologically driven imaging

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strategy that maximizes diagnostic yield while minimizing unnecessary or ineffective imaging in subgroups of neuroendocrine tumors (Zhang & Kunz, 2022; NCCN, 2026).

Health Equity Considerations

Population-based and national cohort studies demonstrate meaningful disparities in the incidence, presentation, and outcomes of gastrointestinal and pancreatic neuroendocrine cancers by race, ethnicity, geography, and socioeconomic status. Non-Hispanic Black individuals experience the highest overall incidence of gastroenteropancreatic neuroendocrine neoplasms, with particularly elevated rates for small intestine, colorectal, and rectal primaries, while Hispanic populations have been shown to experience higher cancer-specific mortality for small intestine neuroendocrine tumors despite adjustment for clinical and sociodemographic factors (Paciorek et al., 2025). Socioeconomic and insurance-related factors further influence outcomes, as higher household income and private insurance or Medicare coverage are consistently associated with improved survival, whereas Medicaid coverage does not confer a similar survival benefit, highlighting persistent structural barriers beyond nominal access to care (Uhlig et al., 2024). These findings underscore that race and ethnicity function as proxies for broader upstream determinants of health, including neighborhood socioeconomic conditions, insurance stability, and healthcare access, rather than intrinsic biological differences alone (Paciorek et al., 2025; Uhlig et al., 2024).

Geographic disparities also affect diagnostic pathways, treatment access, and long-term outcomes, particularly for pancreatic neuroendocrine tumors. Patients residing in rural areas experience significantly worse overall survival following pancreatic neuroendocrine tumor resection compared with urban counterparts, even after adjustment for disease stage, comorbidities, income, and distance to treatment centers (Mirza et al., 2024). Limited availability of specialty care, longer travel distances, healthcare workforce shortages, and financial toxicity associated with prolonged surveillance and multimodality treatment may contribute to delayed diagnosis, treatment interruptions, and reduced survivorship in these populations (Mirza et al., 2024; Uhlig et al., 2024). Given the strong prognostic importance of tumor grade, stage, and timely detection, inequities in access to high-quality imaging, subspecialty consultation, and longitudinal follow-up may exacerbate outcome disparities (Malik et al., 2023). Imaging guideline implementation should therefore support equitable access to appropriate diagnostic and surveillance imaging across diverse populations, with particular attention to individuals from historically marginalized racial and ethnic groups, rural communities, and lower socioeconomic strata.

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Gastrointestinal/Pancreatic Neuroendocrine Cancers – Suspected/ Diagnosis (ONC-15.2)

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Criteria

Indication	Medically Necessary Imaging Study
• Systemic symptoms strongly suggestive of functioning neuroendocrine tumor • Suspicious findings on other imaging studies • Unexplained elevation in ANY of the following: ◦ Chromogranin A ◦ 5HIAA ◦ Insulin ◦ VIP ◦ Glucagon ◦ Gastrin ◦ Substance P ◦ Serotonin ◦ Somatostatin	ANY of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) **OR** MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT with contrast or MRI without and with contrast of any other symptomatic body areas
• Continued suspicion for gastrointestinal/pancreatic neuroendocrine cancers with negative/inconclusive CT or MRI	ONE of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE

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Background and Supporting Information

Gastrointestinal and pancreatic neuroendocrine tumors (GEP-NETs) arise from neuroendocrine cells distributed throughout the gastrointestinal tract and pancreas and exhibit heterogeneous clinical behavior, including both functioning (hormone-secreting) and non-functioning tumors. Functioning tumors may present with characteristic clinical syndromes related to hormone overproduction, whereas non-functioning tumors are often asymptomatic and detected incidentally or at advanced stages (Hesami et al., 2024; Galgano et al., 2022).

GEP-NETs demonstrate variable biologic behavior and are frequently small and difficult to localize, particularly in early disease. Primary tumors may arise in the pancreas, small bowel, or other gastrointestinal sites, and detection is often complicated by small lesion size, variable enhancement patterns, and diverse anatomical locations (Hesami et al., 2024).

Evidence Discussion

Contrast-enhanced CT and MRI are the initial imaging modalities in individuals with suspected gastrointestinal or pancreatic neuroendocrine tumors due to their complementary strengths in tumor detection and characterization. CT provides rapid, high-resolution assessment and is effective for identifying primary small bowel tumors, lymphadenopathy, and metastatic disease, while MRI offers superior soft tissue contrast and is more sensitive for detecting pancreatic lesions and hepatic metastases. This combined approach improves detection across varied tumor types and anatomic locations (Hesami et al., 2024; Galgano et al., 2022).

The use of cross-sectional imaging of the chest, abdomen, pelvis, and other symptomatic areas is supported because neuroendocrine tumors commonly present with metastatic involvement at diagnosis, particularly in the liver, lymph nodes, and lungs. Comprehensive imaging allows accurate staging and localization, which are essential for management planning and may identify clinically occult disease not evident from biochemical testing alone (Hesami et al., 2024).

When CT or MRI findings are negative or inconclusive in the setting of continued clinical suspicion, somatostatin receptor (SSR)-based PET imaging is supported due to its high sensitivity and specificity for well-differentiated neuroendocrine tumors. SSR PET/CT provides whole-body functional imaging and can detect small primary tumors, lymph node metastases, bone lesions, and occult disease not visualized on anatomic imaging, improving diagnostic accuracy and staging (Galgano et al., 2022; Zhang & Kunz, 2022).

The selective use of SSR PET/CT following inconclusive conventional imaging balances benefits and harms. While SSR PET/CT offers high diagnostic yield and management impact, it has limitations including potential false-positive findings from physiologic or inflammatory uptake and reduced sensitivity for very small hepatic lesions. Additionally,

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cost and availability considerations support reserving this modality for cases with unresolved diagnostic uncertainty rather than routine first-line use. FDG-based PET has limited utility in this population because most well-differentiated GEP-NETs have low metabolic activity and may not demonstrate significant uptake (Galgano et al., 2022).

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Gastrointestinal/Pancreatic Neuroendocrine Cancers – Initial Work-up/Staging (ONC-15.3)

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Criteria

- For undifferentiated neuroendocrine tumors, see: **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors ONC-31.8**

Indication	Medically Necessary Imaging Study
ANY of the following: • Well-differentiated Grade 1 or 2 (low-grade) tumors of the following sites: ◦ Jejunal ◦ Ileal ◦ Colon ◦ Neuroendocrine tumors of unknown primary • Type 2 or 3 Gastric • Neuroendocrine tumors of unknown primary • Well-differentiated Grade 3 (high-grade) tumors *For poorly differentiated neuroendocrine tumors outside of the lung, see **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)**	If not already done, ANY or ALL of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • And ONE of the following: ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ CT Abdomen and Pelvis without and with contrast (CPT® 74178) ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast

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Indication	Medically Necessary Imaging Study
All other GI or pancreatic neuroendocrine tumors, including, but not limited to, duodenal, appendix (greater than 2cm or any tumor size with incomplete resection or positive nodes/margins), rectal (T2-T4 or positive nodes), and pancreas (nonfunctional, gastrinoma, insulinoma, glucagonoma, VIPoma)	If not already done: • CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) OR MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)
Locally advanced or metastatic gastrointestinal/pancreatic neuroendocrine tumors (any location or histology) not amenable to curative intent resection to assess candidacy for treatment with somatostatin analogues	If not already done, ANY or ALL of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • And ONE of the following: ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ CT Abdomen and Pelvis without and with contrast (CPT® 74178) ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Inconclusive CT or MRI scans in individuals with gastrointestinal/ pancreatic neuroendocrine tumors	ONE of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with gastrointestinal/pancreatic neuroendocrine tumors: • Markers fail to normalize after complete resection AND CT/MRI and somatostatin-receptor based study are negative • Biopsy-proven neuroendocrine tumor of unknown primary site AND CT/MRI and somatostatin-receptor based study are negative	• FDG-PET/CT (CPT® 78815)

Background and Supporting Information

Gastrointestinal and pancreatic neuroendocrine tumors are heterogeneous neoplasms arising from neuroendocrine cells of the digestive system and pancreas, with variable biologic behavior ranging from indolent well-differentiated tumors to more aggressive forms. Classification is based on tumor differentiation and proliferative index, which influences imaging strategy and prognosis. These tumors are frequently slow-growing but may present with metastatic disease at diagnosis, most commonly involving the liver and lymph nodes (Hesami et al., 2024; NCCN, 2026).

Well-differentiated neuroendocrine tumors often demonstrate somatostatin receptor expression, which provides a molecular target for functional imaging. In contrast, poorly differentiated tumors may have less receptor expression and require alternative imaging approaches. The biologic variability of these tumors necessitates a multimodality imaging strategy incorporating both anatomic and functional techniques (Galgano et al., 2022; NCCN, 2026).

Evidence Discussion

Cross-sectional imaging with contrast-enhanced CT or MRI of the chest, abdomen, and pelvis is the initial staging approach for gastrointestinal and pancreatic neuroendocrine tumors because it provides comprehensive anatomic evaluation of the primary tumor and metastatic disease. CT offers rapid, high-resolution imaging and is effective for detecting small bowel primaries and lymphadenopathy, while MRI provides superior soft tissue contrast and is more sensitive for detecting pancreatic tumors and hepatic metastases. These complementary strengths support the use of either modality based on clinical indication and tumor location (Hesami et al., 2024; Galgano et al., 2022).

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Somatostatin receptor (SSR)-based PET imaging is supported in addition to cross-sectional imaging for well-differentiated tumors, including grade 1–2 tumors of the small bowel, colon, and stomach, as well as grade 3 well-differentiated tumors and tumors of unknown primary. SSR PET/CT provides high sensitivity and specificity for detection of receptor-positive disease, allows whole-body assessment, and improves detection of small primary tumors, nodal metastases, bone lesions, and occult disease not visualized on CT or MRI. This improves staging accuracy and can significantly impact management decisions (Galgano et al., 2022; NCCN, 2026).

The use of SSR PET imaging in cases of locally advanced or metastatic disease is further supported for assessment of candidacy for somatostatin analog therapies, as these treatments require demonstration of receptor expression. SSR PET provides noninvasive evaluation of receptor status and disease distribution, which is essential for therapeutic planning, including selection for peptide receptor radionuclide therapy or somatostatin analog therapy (Galgano et al., 2022; NCCN, 2026).

When CT or MRI findings are inconclusive, SSR PET imaging is supported as a problem-solving tool due to its ability to identify otherwise occult disease and clarify indeterminate findings. However, limitations include potential false-positive uptake from physiologic or inflammatory processes and reduced sensitivity for very small hepatic lesions compared with high-quality MRI. FDG-PET/CT is reserved for select scenarios, such as tumors of unknown primary or cases with persistent abnormal tumor markers despite negative conventional and SSR imaging, as FDG uptake is generally limited in well-differentiated tumors but may identify more aggressive or poorly differentiated disease (Galgano et al., 2022; Hesami et al., 2024; NCCN, 2026).

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Gastrointestinal/Pancreatic Neuroendocrine Cancers – Restaging/ Recurrence (ONC-15.4)

ON.NA.0015.4.A
v1.0.2027

Criteria

Indication	Medically Necessary Imaging Study
All individuals with gastrointestinal/pancreatic neuroendocrine cancers after surgical resection	• See: **Gastrointestinal/Pancreatic Neuroendocrine Cancers – Surveillance (ONC-15.5)**
Unresectable/metastatic disease on treatment with somatostatin analogues in individuals with gastrointestinal/pancreatic neuroendocrine cancers	• CT or MRI of involved body area no more frequently than every 3 months
Unresectable/metastatic disease on treatment with chemotherapy or PRRT (i.e., Lutathera) in individuals with gastrointestinal/pancreatic neuroendocrine cancers	• CT or MRI of involved body area every 2 cycles (6 to 8 weeks)

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Indication	Medically Necessary Imaging Study
Suspected recurrence in individuals with gastrointestinal/pancreatic neuroendocrine cancers	• PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE AND • CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) And ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Continued suspicion for recurrence in individuals with gastrointestinal/pancreatic neuroendocrine cancers with negative or inconclusive CT or MRI, and PET not available	• Octreotide scan: ◦ Any one of the following planar imaging codes - CPT® 78801, 78802, or 78804 ◦ Any one of the following SPECT/SPECT-CT codes - CPT® 78803, 78830, 78831, 78832 - may be approved as an add-on
To assess candidacy for peptide receptor radionuclide therapy (PRRT) with Lutetium ^{177}Lu-dotatate in individuals with gastrointestinal/pancreatic neuroendocrine cancers	• PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE

Background and Supporting Information

Gastrointestinal and pancreatic neuroendocrine tumors (GEP-NETs) are a heterogeneous group of neoplasms arising from neuroendocrine cells, with variable biologic behavior and clinical course. Well-differentiated tumors often exhibit indolent growth but retain the potential for metastatic spread, most commonly to the liver, lymph

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nodes, bone, and lungs. Disease recurrence and progression may occur even after initial treatment, necessitating ongoing imaging evaluation guided by tumor biology and treatment approach (Hesami et al., 2024; NCCN, 2026).

Treatment strategies for advanced GEP-NETs include somatostatin analogues, chemotherapy, and peptide receptor radionuclide therapy (PRRT). Imaging during therapy is used to assess treatment response and identify progression, with frequency and modality selection influenced by tumor grade, aggressiveness, and treatment type (Galgano et al., 2022; NCCN, 2026).

Evidence Discussion

For individuals with unresectable or metastatic gastrointestinal and pancreatic neuroendocrine tumors undergoing systemic therapy, interval cross-sectional imaging with CT or MRI is supported for monitoring disease status. NCCN indicated that imaging frequency should reflect tumor biology and treatment type, with less frequent imaging (e.g., every 3 months) appropriate for individuals receiving somatostatin analogue therapy due to typically indolent disease, and more frequent imaging (every 2 treatment cycles, approximately 6–8 weeks) appropriate during chemotherapy or PRRT where more rapid changes in tumor burden may occur. This approach balances timely detection of progression with minimization of unnecessary imaging (NCCN, 2026).

In the setting of suspected recurrence, combined anatomic and functional imaging is supported. CT or MRI provides detailed evaluation of disease distribution and structural involvement, while SSR-based PET/CT or PET/MRI offers high sensitivity for detecting recurrent or metastatic disease, including small lesions, nodal disease, bone metastases, and occult disease not visualized on conventional imaging. This combined approach improves diagnostic accuracy and informs clinical decision-making (NCCN, 2026).

SSR PET imaging is additionally supported to assess candidacy for peptide receptor radionuclide therapy (PRRT), as treatment efficacy depends on demonstration of somatostatin receptor expression. SSR PET provides noninvasive whole-body evaluation of receptor status and tumor burden, which is critical for patient selection and treatment planning. High sensitivity and specificity of SSR PET support its use in this context (NCCN, 2026).

Octreotide scintigraphy is reserved as a problem-solving modality when SSR PET is unavailable or inconclusive. Evidence demonstrates that octreotide scans are less sensitive and have lower spatial resolution compared with SSR PET-based imaging, limiting their diagnostic performance. Similarly, while FDG-PET/CT may have value in select cases, such as aggressive or dedifferentiated disease, it is not routinely required for well-differentiated tumors due to low metabolic activity and limited tracer uptake. Overall, a multimodality imaging strategy tailored to clinical context optimizes detection

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of recurrence while minimizing unnecessary imaging and associated harms (NCCN, 2026).

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Gastrointestinal/Pancreatic Neuroendocrine Cancers – Surveillance (ONC-15.5)

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Criteria

Indication	Medically Necessary Imaging Study
ANY of the following: • Appendix carcinoid <1cm, completely resected • Rectal carcinoid <1cm, completely resected • Gastric carcinoid treated with complete endoscopic resection	• Advanced imaging is not medically necessary for surveillance
Rectal carcinoid 1-2cm, completely resected	• MRI Pelvis without and with contrast (CPT® 72197) at 6 and 12 months post resection. No further routine surveillance.
All other GI neuroendocrine tumors (stomach, large and small intestine)	• CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast once at 3 to 12 months post-operatively and every 12-24 months up to year 10
Unresected GI neuroendocrine tumors being monitored with observation alone	• CT Abdomen with contrast (CPT® 74160) once at 3 to 12 months from initial diagnosis, then every 3 months for 1 year, then every 6 months in year 2, and then annually up to year 10
Pancreatic neuroendocrine tumors	• CT Abdomen with contrast (CPT® 74160) once at 3 to 12 months post-operatively then annually up to year 10

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Indication	Medically Necessary Imaging Study
Unresected pancreatic neuroendocrine tumors being monitored with observation alone	• CT Abdomen with contrast (CPT® 74160) once at 3 to 12 months from initial diagnosis then annually up to year 10
Measurable metastatic disease on maintenance treatment or off therapy in individuals with gastrointestinal/pancreatic neuroendocrine tumors	• CT of involved body area no more frequently than every 3 months

Background and Supporting Information

Gastrointestinal neuroendocrine tumors are a heterogeneous group of neoplasms with variable biologic behavior and prognosis, influenced by tumor size, grade, and extent of invasion. Many tumors, particularly rectal and appendiceal lesions, are detected incidentally and are often small and well-differentiated at diagnosis, contributing to generally favorable outcomes in selected low-risk populations (Maione et al., 2021; Wang et al., 2022).

Risk of recurrence and metastatic progression is closely associated with tumor characteristics, including tumor size, grade, and lymphovascular invasion. Small, well-differentiated tumors (<1cm) have a very low risk of metastasis, while larger or higher-grade tumors demonstrate increasing risk of recurrence and distant spread. Prognosis varies widely across disease subtypes, with localized disease associated with more favorable outcomes compared with regional or metastatic disease (Maione et al., 2021; Wang et al., 2022).

Surveillance strategies are therefore risk-adapted, reflecting differences in recurrence risk across tumor types and clinical scenarios. Long-term follow-up may be required for many neuroendocrine tumors due to their indolent growth patterns and potential for late recurrence, particularly in patients with higher-risk disease features (Maione et al., 2021).

Evidence Discussion

Avoidance of routine surveillance imaging is supported for completely resected low-risk tumors such as appendiceal carcinoids <1cm, rectal carcinoids <1cm, and gastric carcinoids treated with complete endoscopic resection. These tumors demonstrate excellent prognosis with very low risk of recurrence or metastasis, and evidence

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supports observation without imaging to minimize unnecessary radiation exposure, cost, and downstream testing (Maione et al., 2021; Wang et al., 2022; NCCN, 2026).

For intermediate-risk tumors such as rectal carcinoids measuring 1–2 cm, limited-duration surveillance with MRI pelvis is supported due to a measurable but relatively low risk of recurrence or nodal disease. Tumor size is a key determinant of metastatic risk, and short-term imaging allows detection of early recurrence while avoiding prolonged unnecessary follow-up in patients with otherwise favorable disease biology (Maione et al., 2021; NCCN, 2026).

For other gastrointestinal neuroendocrine tumors and pancreatic neuroendocrine tumors, periodic cross-sectional imaging with CT or MRI is supported due to the potential for delayed recurrence and metastatic spread. Neuroendocrine tumors often demonstrate indolent but persistent growth, and recurrence may occur years after initial treatment. Long-term imaging surveillance, extending up to 10 years, balances early detection of recurrence with the recognition that excessive imaging may increase cumulative costs and patient burden (Maione et al., 2021; Wang et al., 2022; NCCN, 2026).

More frequent imaging is supported in individuals with unresected tumors or measurable metastatic disease due to the higher risk of progression. In these populations, shorter imaging intervals allow timely detection of disease progression to guide management decisions. However, imaging frequency is limited (e.g., no more frequently than every 3 months) to balance clinical benefit with potential harms, including cumulative radiation exposure and unnecessary interventions. Overall, a risk-adapted surveillance approach aligns imaging intensity with tumor biology and clinical risk, optimizing detection of clinically meaningful recurrence while minimizing overuse (Maione et al., 2021; Wang et al., 2022; NCCN, 2026).

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Bronchopulmonary or Thymic Carcinoid – Initial Staging (ONC-15.6)

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Criteria

Indication	Medically Necessary Imaging Study
Initial diagnosis in individuals with bronchopulmonary or thymic carcinoid	If not already done: • CT Chest with contrast (CPT® 71260) • CT Abdomen with contrast (CPT® 74160) or without and with contrast (CPT® 74170) or MRI Abdomen (CPT® 74183) without and with contrast
Inconclusive CT or MRI scans in individuals with bronchopulmonary or thymic carcinoid	ONE of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE
ANY of the following in individuals with bronchopulmonary or thymic carcinoid: • Markers fail to normalize after complete resection AND CT/MRI and somatostatin-receptor based study are negative • Biopsy-proven neuroendocrine tumor of unknown primary site AND CT/MRI and somatostatin-receptor based study are negative	• FDG-PET/CT (CPT® 78815) OR PET/MRI (CPT® 78813 and CPT® 76498)

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Indication	Medically Necessary Imaging Study
Locally advanced or metastatic disease (any location or histology) not amenable to curative intent resection to assess candidacy for treatment with somatostatin analogues in individuals with bronchopulmonary or thymic carcinoid	If not already done, ANY or ALL of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • And ONE of the following: ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ CT Abdomen and Pelvis without and with contrast (CPT® 74178) ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast

Background and Supporting Information

Bronchopulmonary and thymic carcinoid tumors are well-differentiated neuroendocrine neoplasms arising from neuroendocrine cells of the lung and thymus. These tumors are typically indolent but have variable metastatic potential depending on location, histologic subtype, and tumor burden. Bronchial carcinoids are more commonly diagnosed at earlier stages, whereas thymic carcinoids are more frequently advanced at presentation and associated with more aggressive disease behavior (Hesami et al., 2024).

Evidence Discussion

Contrast-enhanced CT of the chest and cross-sectional imaging of the abdomen with CT or MRI are supported for initial staging of bronchopulmonary and thymic carcinoid tumors due to their ability to evaluate both primary tumor extent and metastatic disease. CT is highly effective for assessment of thoracic disease and detection of pulmonary lesions and lymphadenopathy, while MRI offers superior sensitivity for detection of hepatic metastases, which are among the most common sites of spread. This combined anatomic imaging approach improves staging accuracy and supports treatment planning (Hesami et al., 2024; Galgano et al., 2022).

SSR-based PET imaging is supported when CT or MRI findings are inconclusive, as well-differentiated carcinoid tumors frequently express somatostatin receptors. SSR

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PET imaging provides high sensitivity for detection of primary and metastatic disease, including small lesions not visualized on conventional imaging, and offers whole-body assessment. This contributes to more accurate staging and may influence management decisions, particularly in identifying occult disease (Galgano et al., 2022).

In cases where tumor markers fail to normalize after resection or when a neuroendocrine tumor is identified without a clear primary site and both anatomic and SSR imaging are negative, FDG-PET/CT is supported. Although well-differentiated carcinoid tumors often demonstrate limited FDG uptake, FDG-PET may identify higher-grade or dedifferentiated disease with increased metabolic activity, improving detection in more aggressive tumor subtypes (Galgano et al., 2022).

For individuals with locally advanced or metastatic disease not amenable to curative resection, combined anatomic imaging and SSR-based PET are supported to assess candidacy for somatostatin analog therapy. SSR PET provides critical information regarding receptor expression, which is required for therapy selection, while CT or MRI defines disease burden and distribution. This integrated imaging strategy optimizes treatment planning while limiting unnecessary imaging modalities (Hesami et al., 2024; Galgano et al., 2022).

Health Equity Considerations

Bronchopulmonary and thymic carcinoid tumors are rare neoplasms whose diagnosis and management are disproportionately affected by inequities in access to specialized imaging, pathology expertise, and multidisciplinary care. Delays in diagnosis are more common in resource-limited settings, where nonspecific respiratory symptoms may be misattributed to more prevalent infectious diseases, leading to prolonged symptom duration and more advanced disease at presentation (Deme et al., 2024). Reliance on advanced imaging modalities such as contrast-enhanced CT, somatostatin receptor imaging, and PET/CT is critical for accurate staging and surveillance, yet access to these technologies varies widely by geography, health system resources, and insurance status, contributing to disparities in timely diagnosis and optimal management (Lau et al., 2022; Soldath et al., 2021). Additionally, racial and socioeconomic differences in lung cancer imaging utilization may similarly affect patients with bronchopulmonary carcinoids, particularly because these tumors are often detected incidentally through imaging performed for other indications (Soldath et al., 2021).

Equity considerations are further compounded by the need for care at high-volume or specialty centers, which are more likely to offer lung-sparing surgical approaches, minimally invasive techniques, and guideline-concordant follow-up imaging associated with improved long-term outcomes (Soldath et al., 2021). Patients from underserved populations may face barriers such as travel distance, limited referral networks, and financial constraints that restrict access to these centers, potentially resulting in more invasive surgical procedures and reduced survival (Deme et al., 2024). For thymic

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carcinoids, disproportionate impacts may also be seen among patients with hereditary syndromes such as multiple endocrine neoplasia type 1, underscoring the importance of equitable access to genetic counseling, screening, and longitudinal imaging surveillance (Barone & Zhang, 2024; Lau et al., 2022). Efforts to standardize imaging pathways, expand access to advanced diagnostic modalities, and improve provider awareness in diverse clinical settings are essential to reducing inequities in outcomes for patients with bronchopulmonary or thymic carcinoid tumors.

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Bronchopulmonary or Thymic Carcinoid – Restaging/Recurrence (ONC-15.7)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with bronchopulmonary or thymic carcinoid after surgical resection	• See: **Bronchopulmonary or Thymic Carcinoid - Surveillance (ONC-15.8)**
Unresectable/metastatic disease on treatment with somatostatin analogues in individuals with bronchopulmonary or thymic carcinoid	• CT or MRI of involved body area no more frequently than every 3 months
Unresectable/metastatic disease on treatment with chemotherapy or PRRT (i.e., Lutathera) in individuals with bronchopulmonary or thymic carcinoid	• CT or MRI of involved body area every 2 cycles (6 to 8 weeks)
Progression of symptoms or elevation of tumor markers in individuals with bronchopulmonary or thymic carcinoid	• CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260) And ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast

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Indication	Medically Necessary Imaging Study
Continued suspicion for recurrence with negative or inconclusive CT or MRI in individuals with bronchopulmonary or thymic carcinoid	ONE of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE
To assess candidacy for peptide receptor radionuclide therapy (PRRT) with Lutetium ^{177}Lu-dotatate in individuals with bronchopulmonary or thymic carcinoid	• PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE

Background and Supporting Information

Bronchopulmonary and thymic carcinoid tumors are well-differentiated neuroendocrine neoplasms with variable biologic behavior and potential for recurrence or progression over time. Although many bronchial carcinoids are diagnosed at earlier stages, both bronchopulmonary and thymic tumors can demonstrate metastatic spread, particularly to the liver, bone, and lungs. Restaging and recurrence assessment rely on imaging to evaluate changes in tumor burden and disease distribution following treatment (Hesami et al., 2024; Galgano et al., 2022).

Evidence Discussion

For individuals with unresectable or metastatic bronchopulmonary or thymic carcinoid tumors receiving treatment, serial imaging with CT or MRI is supported to monitor disease status and guide management decisions. Imaging intervals are based on treatment type and expected disease kinetics. In patients receiving somatostatin analogue therapy, longer intervals (e.g., no more frequently than every 3 months) are appropriate given the typically indolent course of well-differentiated tumors. In contrast, more frequent imaging (every 2 treatment cycles, approximately 6–8 weeks) is supported during chemotherapy due to the potential for more rapid disease progression or response (Galgano et al., 2022; Hesami et al., 2024).

In the setting of progression of symptoms or rising tumor markers, repeat cross-sectional imaging of the chest and abdomen/pelvis is supported because these

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modalities provide detailed anatomic assessment of tumor burden, including detection of new or progressive metastatic disease. CT is particularly effective for evaluation of thoracic disease and lymphadenopathy, while MRI offers improved sensitivity for hepatic metastases, supporting their complementary use depending on clinical context (Hesami et al., 2024).

When conventional imaging with CT or MRI is negative or inconclusive despite continued clinical suspicion for recurrence, SSR-based PET imaging is supported. Well-differentiated carcinoid tumors frequently express somatostatin receptors, allowing SSR PET to identify occult disease not visualized on anatomic imaging. This modality provides whole-body evaluation and improves detection of small lesions, including bone and nodal metastases, thereby enhancing diagnostic accuracy and influencing management (Galgano et al., 2022).

The selective use of SSR PET after inconclusive conventional imaging balances clinical benefit with potential harms. While SSR PET offers improved sensitivity, limitations include availability, cost, and potential false-positive uptake in inflammatory or physiologic conditions. Therefore, reserving SSR PET for cases with unresolved diagnostic uncertainty aligns imaging selection with tumor biology and minimizes unnecessary imaging, while maintaining high diagnostic yield in suspected recurrence (Galgano et al., 2022; Hesami et al., 2024).

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Bronchopulmonary or Thymic Carcinoid – Surveillance (ONC-15.8)

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v1.0.2027

Criteria

Indication	Medically Necessary Imaging Study
Carcinoid tumors of lung or thymus	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) and CT Abdomen with contrast (CPT® 74160) once at 3 to 12 months post-resection and then annually up to year 10
Unresected primary tumors being monitored with observation alone in individuals with bronchopulmonary or thymic carcinoid	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) and CT Abdomen with contrast (CPT® 74160) once at 3 to 12 months from initial diagnosis then annually up to year 10
Asymptomatic lung or thymus distant metastasis on observation alone in individuals with bronchopulmonary or thymic carcinoid	Every 3 months for 1 year, and then every 6 months: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Measurable metastatic disease on maintenance treatment or off therapy in individuals with bronchopulmonary or thymic carcinoid	• CT Chest with contrast (CPT® 71260) • CT of involved body area no more frequently than every 3 months

Background and Supporting Information

Bronchopulmonary and thymic carcinoid tumors are well-differentiated neuroendocrine neoplasms classified as typical or atypical carcinoids based on mitotic activity and necrosis. These tumors generally have more favorable outcomes than poorly differentiated neuroendocrine carcinomas, although prognosis varies by histology and

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stage. Lung carcinoids are often diagnosed at earlier stages, while thymic carcinoids are more frequently advanced at presentation and associated with poorer outcomes (Baudin et al., 2021).

Tumor biology is characterized by relatively slow growth but a persistent risk of recurrence, including both local and distant disease. Recurrence may occur years after initial treatment, reflecting the indolent nature of many carcinoids. Common metastatic sites include liver, bone, lung, pleura, and pericardium, necessitating imaging strategies capable of evaluating both thoracic and extrathoracic disease (Baudin et al., 2021).

Risk stratification is based on WHO histologic classification and TNM staging, which are key determinants of prognosis and recurrence risk. Typical carcinoids generally have more favorable outcomes compared with atypical carcinoids, which have higher rates of nodal involvement and recurrence. Despite favorable survival in many patients, prolonged survival underscores the importance of long-term surveillance to detect recurrent or progressive disease (Baudin et al., 2021).

Evidence Discussion

The recommended use of CT chest and abdomen for surveillance of bronchopulmonary and thymic carcinoid tumors reflects the known distribution of recurrent and metastatic disease. Evidence demonstrates that these tumors most commonly recur in the thorax or metastasize to the liver, bone, and lung, supporting the inclusion of both chest and abdominal imaging in follow-up protocols to improve detection of clinically significant disease (Baudin et al., 2021; NCCN, 2026). Imaging confined to the chest alone may miss extrathoracic metastases, while broader imaging ensures comprehensive assessment aligned with disease biology.

The surveillance intervals outlined in the criteria are supported by the indolent but persistent nature of carcinoid tumors. Recurrence rates remain clinically meaningful over extended follow-up periods, with some recurrences occurring many years after resection, and guidelines emphasize lifelong surveillance given the frequency of late events (Baudin et al., 2021). This supports imaging at 3–12 months post-resection to establish a baseline and detect early recurrence, followed by long-term surveillance extending up to 10 years, balancing detection of relapse with avoidance of unnecessary imaging.

For individuals with unresected primary tumors or asymptomatic metastatic disease on observation, more frequent imaging is supported by the importance of radiologic tumor growth rate in guiding management. Evidence indicates that tumor growth kinetics and progression patterns are key determinants of treatment decisions, and that watchful follow-up is appropriate in selected asymptomatic patients with slow-growing disease (Baudin et al., 2021). Short-interval imaging every 3 to 6 months enables timely identification of progression while minimizing overtreatment in stable disease.

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In patients with measurable metastatic disease on treatment or observation, limiting imaging to no more frequently than every 3 months balances clinical benefit and potential harm. While frequent imaging allows earlier detection of progression requiring therapy modification, excessive imaging may increase cumulative radiation exposure and healthcare burden without improving outcomes in this generally indolent population. The recommended interval reflects a compromise that provides adequate disease monitoring while mitigating harms associated with over-imaging, consistent with guideline emphasis on adjusting follow-up intensity to tumor biology and disease trajectory (Baudin et al., 2021; NCCN, 2026).

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Adrenal Tumors – Suspected/Diagnosis (ONC-15.9)

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Criteria

- See: **Adrenal Cortical Lesions (AB-16.1)** in the Abdomen Imaging Guidelines for evaluation of indeterminate adrenal masses.
- Adrenal tumors that involve the adrenal medulla or neural crest tissue outside the adrenal gland include pheochromocytoma, paraganglioma, and paraganglioneuroma.
  - These tumors are imaged according to sections **ONC-15.10 through ONC-15.12**.
  - Malignant adrenal tumors that involve the adrenal cortex are addressed in **Adrenocortical Carcinoma (ONC-15.13).**
- Adrenocortical carcinoma is imaged according to **Adrenocortical Carcinoma (ONC-15.13)**.
- If concern for genetic predisposition syndrome such as MEN, neurofibromatosis, or Von Hippel-Lindau disease, see screening recommendations in **Screening Imaging and Cancer Predisposition Syndromes (PEDONC-2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Background and Supporting Information

Adrenal tumors encompass a heterogeneous group of neoplasms arising from either the adrenal cortex or adrenal medulla, as well as extra-adrenal neural crest–derived tissue. Cortical lesions include benign adenomas and malignant adrenocortical carcinoma, while medullary-related tumors include pheochromocytomas and extra-adrenal paragangliomas. These entities differ significantly in biology, hormonal activity, and malignant potential, necessitating distinct diagnostic and imaging approaches (NCCN, 2026).

Evaluation of suspected adrenal tumors requires differentiation between functional and nonfunctional lesions, as well as characterization of malignancy risk. Imaging plays a central role in defining lesion morphology, while biochemical testing is essential for identifying hormonally active tumors such as pheochromocytoma. Neuroendocrine tumors involving the adrenal medulla or extra-adrenal paraganglia are associated with hereditary syndromes such as multiple endocrine neoplasia (MEN), von Hippel–Lindau disease, and other genetic conditions. Identification of these syndromes is critical, as they influence both initial diagnostic evaluation and long-term surveillance strategies. For these patients, evaluation often includes broader imaging and genetic risk assessment to detect multifocal or synchronous tumors (NCCN, 2026).

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Health Equity Considerations

Adrenal tumors exhibit important health equity challenges related to access to diagnostic imaging, specialty care, and longitudinal management. Population-level data demonstrate that adrenal tumor detection is closely linked to the availability and use of cross-sectional imaging, which varies substantially by geography and health system resources (Huang et al., 2025). Individuals living in rural or non-metropolitan areas and those with limited access to advanced imaging technologies are less likely to undergo timely diagnostic evaluation, contributing to delayed detection of hormonally active or clinically significant adrenal lesions (Ijaz et al., 2025). These disparities may be further compounded among older adults and socioeconomically disadvantaged populations, who face structural barriers such as limited transportation, specialist shortages, and fragmented referral pathways, all of which may hinder appropriate imaging follow-up and surveillance.

Socioeconomic and demographic factors also influence the observed burden and management of non-malignant adrenal tumors. Higher detection rates are reported in regions with higher Human Development Index and gross domestic product, likely reflecting both increased imaging utilization and greater prevalence of metabolic risk factors including obesity, hypertension, diabetes, and physical inactivity that are associated with adrenal tumor development (Huang et al., 2025). Conversely, lower reported incidence in low-resource settings may reflect underdiagnosis rather than true differences in disease prevalence, underscoring the role of inequitable diagnostic capacity (Huang et al., 2025). Within high-income countries, racial and ethnic minority patients have been shown to experience disparities in access to high-volume endocrine care and specialty imaging,

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Adrenal Tumors – Initial Work-up/Staging (ONC-15.10)

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Criteria

- This guideline can be applied to **any primary site** (including beyond adrenal gland) for pheochromocytoma, paraganglioma, or paraganglioneuroma.

Indication	Medically Necessary Imaging Study
For ANY of the following: • Pheochromocytoma • Paraganglioma • Paraganglioneuroma	If not already done: • CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260) And ONE of the following (if not already done): • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • CT with contrast or MRI without and with contrast of primary site (i.e., neck) and any other symptomatic body areas
Hypercortisolemia with ANY of the following in individuals with adrenal tumors: • Tumor greater than 4cm • Inhomogeneous • Irregular margins • Local invasion • Other malignant imaging characteristics	ANY or ALL of the following: • FDG PET/CT (CPT® 78815) • CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183)

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Indication	Medically Necessary Imaging Study
Continued suspicion for adrenal tumor with negative/inconclusive CT or MRI	ONE of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE
All above studies (CT Chest AND CT OR MRI Abdomen +/- Pelvis, AND either a Dotatate PET or Octreoscan) done and negative/inconclusive in individuals with adrenal tumors	• FDG PET/CT scan (CPT® 78815)

Background and Supporting Information

Pheochromocytomas and paragangliomas (PPGLs) are neuroendocrine tumors arising from chromaffin cells of the adrenal medulla or from extra-adrenal paraganglia distributed throughout the sympathetic and parasympathetic nervous systems (Carrasquillo et al., 2021; Fishbein et al., 2021). These tumors may occur in the abdomen, pelvis, thorax, or head and neck, with approximately 95% located in the abdomen and pelvis and a smaller proportion in the chest (Carrasquillo et al., 2021).

Although many PPGLs are benign, metastatic disease develops in up to 15%–25% of patients and may present years after initial diagnosis, reflecting the need for thorough initial staging (Fishbein et al., 2021). Genetic predisposition plays a significant role in PPGL, with up to 40% of cases associated with germline mutations such as SDHx, RET, NF1, and VHL (Fishbein et al., 2021). These genetic factors influence tumor distribution, metastatic potential, and imaging phenotype, further supporting the need for comprehensive staging and tailored imaging strategies based on clinical and molecular risk factors.

Evidence Discussion

Cross-sectional imaging with CT or MRI is the cornerstone of initial work-up and staging of PPGL due to its ability to localize tumors, assess extent of disease, and

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guide surgical planning. Evidence demonstrates that CT and MRI are highly effective for identifying adrenal and extra-adrenal lesions and evaluating local invasion and metastatic spread (Carrasquillo et al., 2021; Fishbein et al., 2021). The inclusion of chest imaging is supported by data showing that a subset of paragangliomas occur in the thorax and that metastatic disease may involve the lungs (Carrasquillo et al., 2021). This comprehensive approach improves staging accuracy but must be balanced against radiation exposure and contrast risks, particularly in younger patients or those requiring repeated imaging.

Functional imaging provides additional diagnostic value in cases of inconclusive or negative anatomic imaging and in detection of multifocal or metastatic disease. Traditional imaging with ^{123}I-MIBG demonstrates high sensitivity for pheochromocytoma but lower sensitivity for paraganglioma, while FDG PET is useful particularly in metastatic or SDHx-associated disease (Carrasquillo et al., 2021). More recent evidence supports the use of somatostatin receptor–based imaging, with ^{68}Ga-DOTA–conjugated PET demonstrating superior lesion detection compared with FDOPA PET, FDG PET, and MIBG scintigraphy (Han et al., 2019). A meta-analysis reported pooled detection rates of approximately 93% for ^{68}Ga-DOTA PET, significantly higher than comparator modalities, supporting its use as a problem-solving tool when conventional imaging is inconclusive (Han et al., 2019).

The use of functional imaging after negative or inconclusive CT/MRI is further supported by its ability to detect small lesions and bone metastases that may not be visualized on anatomic imaging. Studies demonstrate that PET-based imaging can identify additional lesions that alter management in a meaningful proportion of patients, improving staging accuracy and guiding therapy selection (Carrasquillo et al., 2021; Han et al., 2019). However, these benefits must be balanced against increased cost, availability limitations, and radiation exposure, supporting a stepwise approach in which functional imaging is reserved for specific indications rather than routine use.

In patients with suspected aggressive adrenal tumors or hypercortisolemia with concerning imaging characteristics, advanced imaging including FDG PET/CT is supported by evidence showing that malignant lesions tend to demonstrate increased metabolic activity and more aggressive radiographic features. Imaging findings such as tumor size, irregular margins, and local invasion are associated with higher risk of malignancy and justify more comprehensive staging (Fishbein et al., 2021). Overall, the evidence supports a tiered imaging strategy in adrenal tumors, beginning with cross-sectional imaging for localization and staging, followed by selective use of functional imaging to resolve diagnostic uncertainty and improve detection of metastatic disease while minimizing unnecessary imaging-related harms.

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Adrenal Tumors – Restaging/Recurrence (ONC-15.11)

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Criteria

- This guideline can be applied to **any primary site** (including beyond adrenal gland) for pheochromocytoma, paraganglioma, or paraganglioneuroma.

Indication	Medically Necessary Imaging Study
If surgery is primary therapy in individuals with adrenal tumors	See: **ONC-15.12** for surveillance recommendations
Recurrence, progression of symptoms, or elevation of tumor markers in individuals with adrenal tumors	• CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) • CT with contrast of primary site (i.e., neck) and involved areas And ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Continued suspicion for recurrence with negative or inconclusive CT or MRI in individuals with adrenal tumors	ONE of the following: • PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}Cu-DOTATATE

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Indication	Medically Necessary Imaging Study
To assess candidacy for peptide receptor radionuclide therapy (PRRT) with Lutetium ^{177}Lu-dotatate in individuals with adrenal tumors	• PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498) with any ONE of the following SSR radiotracers: ◦ ^{68}Ga-DOTATATE ◦ ^{68}Ga-DOTATOC ◦ ^{64}CU-DOTATATE
For ANY of the following in individuals with adrenal tumors: • All above studies done and negative/ inconclusive • Hypercortisolemia with inconclusive findings on CT • Pheochromocytoma bone-dominant disease • Paraganglioma bone-dominant disease	• FDG-PET/CT scan (CPT® 78815)

Background and Supporting Information

Pheochromocytomas and paragangliomas (PPGLs) are neuroendocrine tumors with potential for recurrence or delayed metastatic spread, even many years after initial treatment (Fishbein et al., 2021). Recurrence may occur locally in the surgical bed due to incomplete resection or tumor spillage, or as distant metastatic disease involving lymph nodes, bone, liver, and lung (Fishbein et al., 2021). Because histopathology alone cannot reliably distinguish tumors that will recur or metastasize, long-term surveillance and restaging imaging are essential components of management (Fishbein et al., 2021).

Evidence Discussion

In individuals with suspected recurrence or progression of adrenal tumors, cross-sectional imaging with CT or MRI is the primary modality for restaging, as it provides accurate assessment of disease extent and distribution. Evidence demonstrates that CT and MRI are highly effective for detecting local recurrence, evaluating involvement

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of adjacent structures, and identifying distant metastases, including those in the lungs, liver, and bone (Carrasquillo et al., 2021; Fishbein et al., 2021). The inclusion of chest imaging is supported by the potential for thoracic metastases and the need for comprehensive staging. This approach improves clinical decision-making but carries potential harms, including cumulative radiation exposure and contrast-related risks, particularly with repeated imaging.

When conventional imaging is negative or inconclusive but clinical suspicion persists, functional imaging provides significant incremental diagnostic value. Evidence shows that PET-based imaging modalities can detect lesions not visualized on CT or MRI, particularly in cases of multifocal or metastatic disease, thereby improving staging accuracy and influencing management (Carrasquillo et al., 2021). Among available tracers, somatostatin receptor–based PET imaging (e.g., ^{68}Ga-DOTATATE) demonstrates high lesion detection rates, with pooled sensitivity around 93% and superior performance compared with FDG PET, FDOPA PET, and MIBG scintigraphy (Han et al., 2019). These characteristics support its use as a problem-solving tool in the setting of inconclusive anatomic imaging.

Somatostatin receptor PET imaging also plays an important role in evaluating candidacy for peptide receptor radionuclide therapy (PRRT), as it identifies tumors expressing somatostatin receptors and predicts therapeutic response. Evidence indicates that high uptake on somatostatin receptor imaging correlates with suitability for targeted radionuclide therapy, making this modality essential for treatment planning in advanced disease (Carrasquillo et al., 2021; Han et al., 2019). However, the use of these studies involves higher cost and limited availability, supporting selective application based on clinical need rather than routine use.

FDG PET/CT provides additional benefit in specific clinical scenarios, including aggressive or metabolically active disease, bone-dominant metastases, or persistent suspicion after negative anatomic and somatostatin receptor imaging. Evidence demonstrates that FDG PET has variable but often high sensitivity in metastatic PPGL and can identify lesions missed by other modalities, particularly in certain genetic subtypes (Carrasquillo et al., 2021). While FDG PET may improve detection in these settings, it also introduces additional radiation exposure and cost, reinforcing its role as a secondary or complementary modality when other imaging is inconclusive.

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Adrenal Tumors – Surveillance (ONC-15.12)

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Criteria

- This guideline can be applied to **any primary site** (including beyond adrenal gland) for pheochromocytoma, paraganglioma, paraganglioneuroma, or hypercortisolemia.

Indication	Medically Necessary Imaging Study
All individuals with adrenal tumors	Once within 3-12 months post resection and then annually for 10 years: • CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and 72197) • CT with contrast of primary site (i.e., neck) and other involved body areas
Measurable metastatic disease being observed off therapy or on maintenance treatment in individuals with adrenal tumors	• CT of involved body area no more frequently than every 3 months for up to 5 years after completion of definitive therapy and annually thereafter

Background and Supporting Information

Pheochromocytomas and paragangliomas (PPGLs) are neuroendocrine tumors with potential for long-term recurrence and delayed metastatic spread, including recurrence many years after definitive therapy (Fishbein et al., 2021). These tumors frequently metastasize to lymph nodes, bone, liver, and lung, and recurrence may occur locally or distantly even after complete surgical resection (Fishbein et al., 2021). The inability to reliably predict tumor behavior based on initial pathology necessitates prolonged surveillance in all patients.

Evidence Discussion

The recommended surveillance strategy using periodic CT or MRI imaging is supported by evidence demonstrating the risk of late recurrence in PPGL, including recurrence

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occurring many years after initial treatment. Long-term follow-up is necessary because metastatic disease may present after prolonged disease-free intervals, with rates of metastasis up to 15%–25% and potential latency extending beyond a decade (Fishbein et al., 2021). Imaging at 3–12 months post-resection establishes a baseline for comparison and allows early detection of recurrence, while annual surveillance for up to 10 years captures delayed relapse without excessive imaging frequency.

Cross-sectional imaging of the chest, abdomen, pelvis, and previously involved body areas is supported by the known distribution of metastatic disease. Evidence shows that PPGL commonly metastasizes to thoracic and abdominal organs, including lung and liver, justifying inclusion of chest and abdominal imaging in surveillance protocols (Carrasquillo et al., 2021; Fishbein et al., 2021). This comprehensive approach improves detection of clinically significant disease but must be balanced against cumulative radiation exposure and contrast-related risks, particularly in younger patients and those requiring prolonged monitoring.

For individuals with measurable metastatic disease under observation or on maintenance therapy, more frequent imaging is supported by the need to monitor disease progression and inform treatment decisions. Evidence indicates that metastatic PPGL may demonstrate variable growth rates, and early identification of progression can guide timely therapeutic intervention (Fishbein et al., 2021). Short-interval imaging (e.g., every 3 months) allows for assessment of tumor kinetics while minimizing unnecessary delays in management, with transition to annual imaging once disease stability is established.

Although functional imaging modalities such as somatostatin receptor PET and FDG PET demonstrate high sensitivity for lesion detection, their routine use in surveillance is not supported due to cost, availability, and radiation exposure. Evidence shows that these modalities are highly sensitive - ^{68}Ga-DOTA PET demonstrating detection rates around 93%—but are most appropriately used in cases of suspected progression or inconclusive anatomic imaging rather than routine follow-up (Han et al., 2019; Carrasquillo et al., 2021). This selective approach balances the benefit of improved detection with the potential harms of over-imaging in a population requiring long-term surveillance.

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Adrenocortical Carcinoma (ONC-15.13)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging in individuals with adrenocortical carcinoma	• FDG PET/CT (CPT® 78815) • CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260) And ONE of the following (if not already done): • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Suspected recurrence in individuals with adrenocortical carcinoma	• CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260) And ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen and Pelvis without and with contrast (CPT® 74178) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
• Inconclusive findings on conventional imaging in individuals with adrenocortical carcinoma	• FDG PET/CT (CPT® 78815)
Surveillance after complete response to definitive treatment in individuals with adrenocortical carcinoma	Annually for 5 years: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen with contrast (CPT® 74160) or MRI Abdomen (CPT® 74183) without and with contrast • CT of other involved body areas with contrast

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Indication	Medically Necessary Imaging Study
Measurable metastatic disease on maintenance therapy or being monitored off therapy in individuals with adrenocortical carcinoma	Every 3 months for up to 5 years after completion of definitive therapy: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • CT with contrast of other involved body areas

Background and Supporting Information

Adrenocortical carcinoma (ACC) is a rare and aggressive malignancy of the adrenal cortex, with an incidence of approximately 1–2 cases per million and variable but generally poor prognosis (Ghosh et al., 2023; Fassnacht et al., 2018). ACC may present as a functional tumor with hormone excess syndromes such as Cushing syndrome or virilization, or as a nonfunctional mass presenting with abdominal or flank pain. At diagnosis, up to 30% of individuals have metastatic disease involving the lung, liver, lymph nodes, or bone, and tumors frequently demonstrate local invasion and vascular extension (Ghosh et al., 2023; NCCN, 2026).

ACC is staged using systems such as ENSAT, incorporating tumor size, local invasion, nodal involvement, and distant metastases, which guide treatment decisions and prognosis (Fassnacht et al., 2018; NCCN, 2026). Despite treatment, ACC carries a significant risk of recurrence, including after complete surgical resection, necessitating ongoing imaging surveillance. Patterns of recurrence often mirror initial metastatic distribution, and disease course may be heterogeneous, ranging from indolent to rapidly progressive. These characteristics support risk-adapted imaging approaches throughout staging, restaging, and surveillance (Fassnacht et al., 2018; Howard et al., 2025; NCCN, 2026).

Evidence Discussion

Cross-sectional imaging with CT or MRI is the cornerstone of initial staging and restaging of ACC, given the high incidence of metastatic disease at diagnosis and the need for comprehensive anatomic assessment. Evidence demonstrates that ACC frequently involves the lung, liver, lymph nodes, and bone, supporting the inclusion of chest and abdominopelvic imaging to accurately define disease extent and guide treatment planning (Ghosh et al., 2023; NCCN, 2026). CT and MRI provide high-resolution evaluation of tumor size, local invasion, and vascular involvement, which are critical for surgical planning; however, repeated imaging introduces cumulative radiation

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exposure and contrast-related risks, particularly during long-term follow-up (Fassnacht et al., 2018; Howard et al., 2025).

FDG PET/CT is supported as an adjunct to conventional imaging for initial staging and as a problem-solving tool. ACC demonstrates increased glucose metabolism, and higher FDG uptake correlates with tumor aggressiveness, tumor burden, and poorer prognosis (Ghosh et al., 2023). Functional imaging improves detection of metastatic disease and may identify lesions not well characterized by CT or MRI, thereby enhancing staging accuracy and influencing management decisions (NCCN, 2026). Evidence also shows high diagnostic performance of FDG PET/CT in detecting recurrent or metastatic disease, supporting its use when conventional imaging findings are inconclusive (Fassnacht et al., 2018; NCCN, 2026). However, PET imaging increases healthcare cost and radiation exposure, supporting its selective use rather than routine repetition.

For suspected recurrence, repeating cross-sectional imaging with CT or MRI is supported by evidence demonstrating that recurrence patterns typically mirror initial disease distribution and may involve both local and distant sites (Fassnacht et al., 2018; NCCN, 2026). Early detection of recurrence is critical given the aggressive biology of ACC and limited effectiveness of systemic therapies in advanced disease. FDG PET/CT provides additional diagnostic yield in cases of inconclusive findings, improving detection of metabolically active disease and guiding subsequent management decisions (Ghosh et al., 2023; NCCN, 2026).

Surveillance imaging strategies are supported by the risk of recurrence even after complete response to definitive therapy, with recurrence occurring in a substantial proportion of patients within the first 5 years. Annual imaging during this period balances early detection of recurrence with minimization of cumulative imaging-related harms, including radiation exposure (Fassnacht et al., 2018; NCCN, 2026). In contrast, individuals with measurable metastatic disease are at higher risk of progression, and more frequent imaging (e.g., every 3 months) allows timely assessment of treatment response and disease progression. This risk-adapted approach optimizes clinical benefit while limiting unnecessary imaging in lower-risk settings (Howard et al., 2025; NCCN, 2026).

Health Equity Considerations

Adrenocortical carcinoma (ACC) is a rare and aggressive malignancy for which timely diagnosis, high-quality imaging, and access to specialized surgical and oncologic care are critical determinants of outcome. National database analyses demonstrate significant disparities in access to potentially curative surgical resection, with lower rates of surgery observed among older individuals, males, Black individuals, and those with non-private insurance or care at community cancer centers (Hammad et al., 2017). These inequities suggest that sociodemographic and insurance-related barriers may influence referral patterns, preoperative evaluation, and access to advanced imaging

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and multidisciplinary expertise required for optimal ACC management. Delays or omissions in definitive imaging and staging may disproportionately affect underserved populations, increasing the likelihood of advanced disease at presentation and limiting treatment options.

More recent analyses confirm persistent differences in treatment delivery by race and insurance status, including lower likelihood of surgery, longer time to treatment, reduced use of lymph node evaluation, and differences in postoperative length of stay among minoritiesand those without private insurance (Holoubek et al., 2022). Although overall survival did not significantly differ by race or insurance after adjustment, these disparities in care processes highlight inequitable access to high-volume endocrine surgery centers and comprehensive imaging-guided management. Imaging guidelines for ACC should therefore emphasize equitable access to high-quality cross-sectional and staging imaging, support timely referral to specialized centers, and recognize structural barriers that may limit optimal care for disadvantaged populations, with the goal of reducing disparities across the diagnostic and treatment continuum.

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Colorectal and Small Bowel Cancer (ONC-16)

Guideline

Colorectal Cancer – General Considerations (ONC-16.0)
Colorectal Cancer – Suspected/Diagnosis (ONC-16.1)
Colorectal Cancer – Initial Work-up/Staging (ONC-16.2)
Colorectal Cancer – Restaging/Recurrence (ONC-16.3)
Colorectal Cancer – Surveillance/Follow-up (ONC-16.4)
Small Bowel Cancer – Initial Work-up/Staging (ONC-16.5)
Small Bowel Cancer – Restaging/Recurrence (ONC-16.6)
Small Bowel Cancer – Surveillance/Follow-up (ONC-16.7)
References (ONC-16)

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Colorectal Cancer – General Considerations (ONC-16.0)

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Criteria

- Neuroendocrine tumors of the bowel are covered in: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)**.
- Appendiceal neoplasms (including pseudomyxoma peritonei) follow imaging guidelines for colorectal cancer.
- For squamous cell carcinoma of the rectum, see: **Anal Carcinoma (ONC-24)**.

Background and Supporting Information

Colorectal cancer (CRC) encompasses malignancies of the colon and rectum and is typically adenocarcinoma arising from the mucosal epithelium, often evolving from adenomatous polyps through a multistep carcinogenic process. Initial evaluation includes colonoscopy with biopsy confirmation and staging assessment to determine locoregional extent and the presence of metastatic disease, which most commonly involves the liver and lungs (NCCN, 2026).

Health Equity Considerations

Colorectal cancer (CRC) exhibits persistent and multifactorial disparities across the continuum of prevention, diagnosis, treatment, and outcomes, disproportionately affecting racial and ethnic minoritized populations, individuals with lower socioeconomic status, and those with limited access to care. Non-Hispanic Black, American Indian and Alaska Native, and Hispanic populations experience higher CRC incidence and mortality compared with non-Hispanic White populations, driven by inequities in screening uptake, delayed diagnosis, and barriers to high-quality diagnostic evaluation and treatment (Carethers & Doubeni, 2021; Hollis & Chu, 2022; Kratzer et al., 2023; Riviere et al., 2024). Geographic factors further compound these disparities, with rural residence and residence in socially disadvantaged or under-resourced urban areas associated with reduced access to timely diagnostic imaging, endoscopy, and specialty oncology care (Kratzer et al., 2023; Tsai et al., 2026). Delays in diagnosis and treatment initiation are particularly notable among younger adults with early-onset CRC, especially among male patients and racially and ethnically minoritized populations living in urban settings, underscoring structural barriers that persist even in areas with high healthcare density (Tsai et al., 2026).

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Differences in access to guideline-concordant imaging, staging, and follow-up care contribute to inequities in treatment and survival, independent of tumor biology. Although emerging evidence suggests racial and ethnic differences in molecular characteristics, such as higher prevalence of KRAS variants among non-Hispanic Black and Hispanic patients, disparities in outcomes persist even when care is standardized, pointing to the dominant influence of health system access, insurance coverage, and care coordination (Carethers & Doubeni, 2021; Rodriguez et al., 2026; Riviere et al., 2024). Populations served by safety-net systems, community health centers, and underfunded tribal health services are less likely to receive timely diagnostic imaging and complete recommended evaluation after abnormal screening tests, including cross-sectional imaging needed for accurate staging and treatment planning (Heintzman et al., 2022; Kratzer et al., 2023). Imaging guidelines for CRC should therefore prioritize equitable access to high-quality diagnostic and surveillance imaging, emphasize timely evaluation after abnormal screening results, and recognize structural and socioeconomic barriers that may impede optimal imaging utilization, with the goal of reducing downstream disparities in stage at diagnosis and outcomes.

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Colorectal Cancer – Suspected/ Diagnosis (ONC-16.1)

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- See: **GI Bleeding (AB-22)** or **CT Colonography (CTC) (AB-25.1)** in the Abdomen Imaging Guidelines for evaluation of suspected colorectal malignancies.
- See: **Abnormal Findings on Endoscopy/Colonoscopy (AB-13.3)** in the Abdomen Imaging Guidelines for evaluation of abnormal findings on endoscopy/colonoscopy.

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Colorectal Cancer – Initial Work-up/ Staging (ONC-16.2)

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Criteria

Indication	Medically Necessary Imaging Study
Carcinoma within a polyp that is completely removed	• No advanced imaging
• Biopsy-proven invasive colon adenocarcinoma or polyp with the following high-risk features: ◦ Fragmented specimen ◦ Margin cannot be assessed ◦ Unfavorable histologic features (high grade histology (i.e., poorly differentiated), angiolymphatic invasion, depth of submucosal invasion greater than 1mm, high tumor budding, or a positive margin) • Colonoscopy findings consistent with colon cancer • Biopsy-proven low or high grade appendiceal mucinous neoplasm (LAMN or HAMN)	• CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) AND • CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
• Biopsy-proven invasive rectal adenocarcinoma or polyp with the following high-risk features: ◦ Fragmented specimen ◦ Margin cannot be assessed ◦ Unfavorable histologic features (high grade histology (i.e., poorly differentiated), angiolymphatic invasion, depth of submucosal invasion greater than 1mm, high tumor budding, or a positive margin) • Colonoscopy findings consistent with rectal cancer	• CT Chest with contrast (CPT® 71260) OR without contrast (CPT® 71250) AND ◦ Any one of the following: ▪ CT Abdomen with contrast (CPT® 74160) OR MRI Abdomen without and with contrast (CPT® 74183) AND ▪ MRI Pelvis without and with contrast (CPT® 72197) OR MRI Pelvis without contrast (CPT® 72195) (in addition to CT Pelvis if already performed)
• Further evaluation of an inconclusive liver lesion seen on CT in individuals with colorectal cancer • Potentially resectable liver metastases in individuals with colorectal cancer	• MRI Abdomen without and with contrast (CPT® 74183)
Rectal adenocarcinoma with ANY one of the following: • Rectal MRI is contraindicated • Rectal MRI is inconclusive • Superficial lesions	• Endorectal ultrasound (CPT® 76872)
ONE of the following in individuals with colorectal cancer: • Isolated metastatic lesion(s) on other imaging and individual is a candidate for aggressive surgical resection or other localized treatment to metastasis for curative intent • Inconclusive conventional imaging • Contraindication to IV contrast	• PET/CT (CPT® 78815)

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Background and Supporting Information

Colorectal cancer (CRC) includes malignancies of the colon and rectum and commonly presents as adenocarcinoma arising from the mucosal epithelium. Colon and rectal cancers are distinct entities with differences in biology, treatment, and patterns of spread (Qiu et al., 2015). At diagnosis, approximately 20% of patients have metastatic disease, most frequently involving the liver and lungs, with less common spread to bone and brain (Qiu et al., 2015). These predictable metastatic patterns inform the need for comprehensive staging imaging of the chest, abdomen, and pelvis.

Evidence Discussion

Cross-sectional imaging with CT of the chest, abdomen, and pelvis is supported as the primary modality for initial staging of colorectal cancer due to its ability to detect distant metastatic disease in the liver and lungs, which are the most common sites of spread. Evidence demonstrates that CT has a high negative predictive value (approximately 90%) for excluding distant metastases and provides a comprehensive evaluation of extrahepatic disease, supporting its role as first-line imaging in staging (Korngold et al., 2025). The benefit of CT-based staging is accurate disease classification and appropriate treatment selection, though risks include radiation exposure and contrast-related adverse effects.

For rectal cancer, MRI is supported as the preferred modality for locoregional staging due to its superior soft tissue resolution and ability to assess tumor relationship to the mesorectal fascia and surrounding pelvic structures. MRI improves assessment of tumor extent and surgical planning, particularly in determining suitability for neoadjuvant therapy and resectability (Korngold et al., 2025). This targeted use enhances staging precision but adds cost and resource utilization, supporting its use specifically for pelvic evaluation rather than systemic staging.

MRI of the abdomen is supported in selected cases for further evaluation of liver lesions or potentially resectable metastases. Evidence shows that MRI provides improved sensitivity compared with CT for detecting liver metastases, particularly in individuals with fatty liver or after chemotherapy, where CT performance may be limited (Korngold et al., 2025). This improves lesion characterization and surgical planning, though it is generally used selectively rather than as a routine replacement for CT.

FDG PET/CT is not recommended for routine initial staging but may provide value in selected cases as an adjunct to conventional imaging. Evidence demonstrates that PET/CT can identify additional metastatic disease and may change management in a subset of patients (approximately 8%–11%), although it has lower lesion-specific accuracy compared with contrast-enhanced CT or MRI and may yield false-positive results in up to 9% of cases (Korngold et al., 2025). These limitations, along with higher cost and radiation exposure, support its use as a problem-solving tool rather than standard staging imaging.

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Colorectal Cancer – Restaging/ Recurrence (ONC-16.3)

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Criteria

Indication	Medically Necessary Imaging Study
• Complete resection in individuals with colorectal cancer • Individuals with colorectal cancer receiving post-operative adjuvant chemotherapy • LAMN or HAMN post-resection	• See: **Surveillance/Follow-up (ONC-16.4)**
Recurrence suspected for colon cancer (i.e., signs or symptoms, elevated CEA)	• CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) AND • CT Abdomen and Pelvis with contrast (CPT® 74177)
Recurrence suspected for rectal cancer (i.e., signs or symptoms, elevated CEA)	• CT Chest with contrast (CPT® 71260) OR without contrast (CPT® 71250) AND ◦ Any one of the following: ▪ CT Abdomen with contrast (CPT® 74160) OR MRI Abdomen without and with contrast (CPT® 74183) AND ▪ MRI Pelvis without and with contrast (CPT® 72197) OR MRI Pelvis without contrast (CPT® 72195) (in addition to CT Pelvis if already performed)

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Indication	Medically Necessary Imaging Study
After completion of planned neoadjuvant therapy in individuals with colorectal cancer	Prior to surgical resection in individuals with non-metastatic rectal cancer: • CT Chest with contrast (CPT® 71260) and Any ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)
Unresected primary disease or metastatic disease on chemotherapy in individuals with colorectal cancer	Every 2 cycles of chemotherapy treatment and at the completion of chemoradiotherapy: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of other involved or symptomatic areas
Individuals with colorectal cancer on adjuvant chemo/RT	Once at 3 months and then once at 4-5 months after start of treatment: • CT Chest with contrast (CPT® 71260) AND • ONE of the following: ◦ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) OR ◦ CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197) OR ◦ CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
Individuals with colorectal cancer on total neoadjuvant therapy (no resection performed or planned)	Once at 6 months and then once at 8-10 months after start of treatment: • CT Chest with contrast (CPT® 71260) AND • ONE of the following: ◦ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) OR ◦ CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197) OR ◦ CT Abdomen and Pelvis with contrast (CPT® 74177)
• Further evaluation of an inconclusive liver lesion seen on CT in individuals with colorectal cancer • Potentially resectable liver metastases in individuals with colorectal cancer	• MRI Abdomen without and with contrast (CPT® 74183)
ONE of the following in individuals with colorectal cancer: • Postoperative elevated or rising CEA or LFTs with negative recent conventional imaging • Isolated metastatic lesion(s) on other imaging and individual is a candidate for aggressive surgical resection or other localized treatment (thermal ablation/embolization) to metastasis for curative intent • Differentiate local tumor recurrence from postoperative and/or post-radiation scarring • Liver-directed therapies (resection, ablation, embolization) are being considered and member has a contraindication to IV contrast	• PET/CT (CPT® 78815)

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Indication	Medically Necessary Imaging Study
New or worsening pelvic pain and recent CT imaging negative or inconclusive in individuals with colorectal cancer	• MRI Pelvis without and with contrast (CPT® 72197) or without contrast (CPT® 72195)

Background and Supporting Information

Colorectal cancer (CRC) includes malignancies of the colon and rectum and frequently recurs following initial therapy, particularly in patients with advanced-stage disease. Recurrence may be locoregional or metastatic, with the liver and lungs representing the most common sites of distant spread. Early identification of recurrent disease is critical, as selected individuals with limited metastatic burden may still be candidates for curative-intent treatments such as surgical resection or liver-directed therapies (NCCN, 2026).

Evidence Discussion

CT of the chest, abdomen, and pelvis is supported as the first-line imaging modality when recurrence of colorectal cancer is suspected. Evidence demonstrates that CT provides comprehensive evaluation of the most common sites of metastatic disease, including liver and lung, and allows for rapid assessment of disease burden. This facilitates timely diagnosis of recurrence and appropriate treatment planning. However, repeated CT imaging exposes patients to cumulative radiation and contrast-related risks, which must be balanced against the clinical benefit (NCCN, 2026).

Repeat imaging after completion of neoadjuvant therapy is supported to confirm the absence of disease progression prior to definitive surgical intervention. This ensures appropriate patient selection for surgery and reduces the risk of non-curative procedures in patients with interval progression. Additionally, serial CT imaging during systemic therapy is supported to assess treatment response and guide ongoing management. Imaging performed at regular intervals allows clinicians to determine whether to continue current therapy or transition to alternative treatment strategies, improving overall care (NCCN, 2026).

MRI of the abdomen is supported as an adjunct modality for further evaluation of indeterminate liver lesions or assessment of potentially resectable metastases. Evidence demonstrates that MRI provides improved sensitivity and characterization of liver metastases compared with CT, particularly in complex clinical scenarios. This enhances surgical planning and selection of candidates for curative-intent interventions, though it is generally reserved for targeted use due to resource considerations (NCCN, 2026).

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PET/CT is supported for use in specific clinical scenarios where conventional imaging is negative or inconclusive, or when there is biochemical suspicion of recurrence such as rising tumor markers. Evidence indicates that PET-based imaging can identify metabolically active disease and clarify ambiguous findings, potentially enabling curative interventions. A systematic review demonstrated high sensitivity and moderate specificity for PET-based techniques in detecting disease, reflecting strong diagnostic performance but also risk of false-positive findings (Ren et al., 2023). Limitations include cost, radiation exposure, and reduced specificity, supporting its role as a problem-solving modality rather than routine restaging imaging.

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Colorectal Cancer – Surveillance/Follow-up (ONC-16.4)

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Criteria

Indication	Medically Necessary Imaging Study
Colon and rectal adenocarcinoma: • Stage I	• No routine advanced imaging
Colon and rectal adenocarcinoma treated with surgery: • Stage II-III	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) after completion of surgery and then annually for 5 years
Stage II-III rectal cancer treated with chemoradiation alone (no surgical treatment)	• CT Chest with contrast (CPT® 71260) and CT Abdomen with contrast (CPT® 74160) and MRI Pelvis (CPT® 72197) without and with contrast or without contrast (CPT® 72195) every 6 months for 3 years* after completion of chemoradiotherapy • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) every 6 months for years 4 and 5 after completion of chemoradiotherapy *CT Pelvis can replace MRI Pelvis if MRI is contraindicated
Colon and rectal adenocarcinoma: • Stage IV or distant metastatic disease (post definitive treatment on or off therapy)	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) every 6 months for 2 years and then annually for 3 years

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Indication	Medically Necessary Imaging Study
Measurable metastatic disease on maintenance therapy in individuals with colorectal cancer	Every 3 months for up to 5 years after completion of active treatment: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Rectal cancer treated with transanal excision alone	Any one of the following every 6 months for 5 years: • Endorectal ultrasound (CPT® 76872) • MRI Pelvis without and with contrast (CPT® 72197) • MRI Pelvis without contrast (CPT® 72195)
Pseudomyxoma peritonei	ONE of each of the following, every 3 months for first year, then every 6 months for 4 more years: • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast or without contrast (CPT® 72195)
LAMN or HAMN	• CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast or without contrast (CPT 72195) every 6 months for 2 years, then every 12 months for up to 10 years ◦ For individuals with a history of metastatic disease at any site, CT Chest with contrast (CPT® 71260) every 6 months for 2 years, then every 12 months for up to 10 years

Background and Supporting Information

Colorectal cancer (CRC) survivors represent a large and growing population, with a substantial proportion of patients at risk for recurrence following curative-intent treatment. Recurrence rates range from approximately 5% to 40%, with the highest

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risk occurring within the first 5 years after treatment (Hardiman et al., 2021). The most common sites of recurrence include the liver, lungs, and peritoneum, reflecting patterns of hematogenous and lymphatic spread (NCCN, 2026).

Surveillance strategies are designed to detect recurrence at an early, potentially curable stage while balancing the risks and costs of ongoing monitoring. Imaging is a core component of surveillance, particularly for patients with stage II–III disease or those treated with curative intent for metastatic disease, as these groups have a higher baseline risk of recurrence (Hardiman et al., 2021; NCCN, 2026).

Risk stratification based on stage, treatment history, and pathologic features guides surveillance intensity. Higher-risk patients, including those with stage II–III disease, stage IV disease treated with curative intent, or specific high-risk features, require more intensive imaging follow-up compared with patients with early-stage disease, who may not benefit from routine advanced imaging (Hardiman et al., 2021; NCCN, 2026).

Evidence Discussion

Surveillance imaging in colorectal cancer is supported by the high incidence and predictable timing of recurrence, with up to 95% of recurrences occurring within 5 years of treatment and the majority within the first 3 years (Hardiman et al., 2021). This supports the use of structured imaging protocols during this period to enable early detection of recurrence, particularly for stage II–III disease where recurrence rates are approximately 20%–30% (NCCN, 2026). Early detection may allow for curative-intent interventions such as metastasectomy, improving clinical outcomes, although repeated imaging introduces cumulative radiation exposure and cost.

The omission of routine imaging in stage I disease is supported by the low risk of recurrence and high cure rates, with survival exceeding 90% in many cases (Hardiman et al., 2021). Routine advanced imaging in this population provides limited clinical benefit and may expose patients to unnecessary harms, supporting a conservative approach. In contrast, patients with stage II–III disease benefit from regular CT imaging following surgery to establish a baseline and monitor for recurrence, with annual imaging for up to 5 years balancing detection of recurrence with minimization of imaging burden (NCCN, 2026).

In rectal cancer, additional surveillance strategies are justified in select populations due to higher risk of local recurrence. Patients treated with local excision or nonoperative management require more frequent local assessment, including endorectal ultrasound or pelvic MRI, because local recurrence rates are higher in these groups (Hardiman et al., 2021). MRI provides improved soft tissue characterization and facilitates differentiation between recurrence and post-treatment changes, supporting its use in targeted surveillance rather than routine systemic imaging alone.

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For patients with stage IV disease treated with curative intent or those with measurable metastatic disease, more frequent imaging is supported to monitor for recurrence or progression. Evidence indicates that imaging at shorter intervals, such as every 3 to 6 months initially, allows timely identification of disease recurrence and facilitates treatment modification (NCCN, 2026). However, randomized trials have demonstrated that more intensive surveillance does not consistently improve overall survival compared with less intensive strategies, although it may increase detection of asymptomatic recurrences and opportunities for curative therapy (Hardiman et al., 2021). This underscores the importance of a risk-adapted imaging approach that balances early detection with avoidance of unnecessary imaging-related harms.

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Small Bowel Cancer – Initial Work-up/ Staging (ONC-16.5)

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Criteria

This section provides imaging guidelines for small bowel adenocarcinoma arising from the duodenum, jejunum, and ileum.

Indication	Medically Necessary Imaging Study
Carcinoma within a polyp that is completely removed	• No advanced imaging
Invasive adenocarcinoma	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast ◦ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) if CT is inconclusive or cannot be performed

Background and Supporting Information

Small bowel adenocarcinoma is a rare malignancy arising from the duodenum, jejunum, or ileum and accounts for a small proportion of gastrointestinal cancers. Despite its rarity, the disease often presents at an advanced stage, necessitating comprehensive diagnostic evaluation to determine the extent of local invasion and distant metastasis (NCCN, 2026).

The overall goal of initial staging imaging is to guide treatment planning by accurately identifying disease extent. This includes differentiating localized from metastatic disease and determining resectability, which are critical factors influencing management strategies (NCCN, 2026).

Evidence Discussion

The absence of advanced imaging for carcinoma within a polyp that has been completely removed is supported by the low likelihood of residual or metastatic disease after complete excision. Avoiding imaging in this setting reduces unnecessary radiation

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exposure, contrast-related risks, and healthcare utilization without compromising diagnostic accuracy or individual outcomes (NCCN, 2026).

For invasive adenocarcinoma, CT imaging of the chest, abdomen, and pelvis with contrast is supported as the primary modality for initial staging because it provides comprehensive evaluation of both locoregional disease and distant metastases. CT is particularly effective at identifying lesions in the liver, lungs, lymph nodes, and peritoneum, which are the most common sites of spread. This enables accurate staging and informs treatment decisions, though risks include radiation exposure and contrast-related adverse events (NCCN, 2026).

MRI of the abdomen and pelvis is supported as an adjunctive modality when CT is inconclusive or cannot be performed. Evidence indicates that MRI provides superior soft tissue characterization, particularly for indeterminate liver lesions, improving diagnostic accuracy and aiding in assessment of disease resectability. This targeted use enhances clinical decision-making while limiting unnecessary imaging (NCCN, 2026).

Overall, the recommended imaging strategy reflects a tiered approach that prioritizes CT for comprehensive staging and reserves MRI for problem-solving scenarios. This approach balances the benefits of accurate disease detection and staging with the need to minimize unnecessary imaging, radiation exposure, and resource utilization (NCCN, 2026).

Health Equity Considerations

Small bowel cancer demonstrates meaningful inequities in incidence, detection, and outcomes across racial, ethnic, socioeconomic, and geographic populations. In the United States, non-Hispanic Black individuals, particularly men, experience the highest incidence rates of small bowel cancer and steeper increases over time compared with other racial and ethnic groups, while Hispanic and Asian/Pacific Islander populations generally have lower reported incidence (Goodman et al., 2015; Mousavi et al., 2024). These disparities are likely multifactorial and reflect a combination of differences in underlying risk factors (e.g., inflammatory bowel disease, obesity, and smoking), as well as unequal access to timely diagnostic evaluation and subspecialty care (Huang et al., 2023; Mousavi et al., 2024). Globally, higher incidence in high-income regions may in part reflect improved diagnostic capacity, whereas underdiagnosis and incomplete cancer registry data in lower-resource settings likely mask true disease burden, further widening apparent equity gaps (Huang et al., 2023).

Barriers to health equity are particularly relevant for imaging-based evaluation, as small bowel tumors often present with vague symptoms and require advanced imaging or endoscopic techniques for detection. Limited access to high-quality cross-sectional imaging, capsule endoscopy, and gastroenterology expertise in underserved or rural populations may contribute to delayed diagnosis and more advanced disease at presentation (Huang et al., 2023; Mousavi et al., 2024). Additionally, pandemic-related

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disruptions disproportionately affected cancer detection in already marginalized populations, with documented declines in reported incidence likely reflecting missed or delayed diagnoses rather than true reductions in disease (Mousavi et al., 2024). Imaging guidelines should therefore be applied with awareness of these inequities, supporting timely and appropriate diagnostic imaging for patients with persistent or unexplained symptoms, particularly among groups at higher risk, to help mitigate disparities in stage at diagnosis and outcomes (Goodman et al., 2015; Huang et al., 2023).

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Small Bowel Cancer – Restaging/ Recurrence (ONC-16.6)

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Criteria

Indication	Medically Necessary Imaging Study
Complete resection in individuals with small bowel cancer	• See Surveillance below
Recurrence suspected in individuals with small bowel cancer	• CT Chest (CPT® 71260) with contrast and CT Abdomen and Pelvis (CPT® 74177) with contrast
Unresected primary disease or metastatic disease on chemotherapy in individuals with small bowel cancer	Every 2 cycles of chemotherapy: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Further evaluation of an inconclusive liver lesion seen on CT in individuals with small bowel cancer	• MRI Abdomen without and with contrast (CPT® 74183)
ONE of the following in individuals with small bowel cancer: • Postoperative elevated or rising CEA or LFTs with negative recent conventional imaging • Isolated metastatic lesion(s) on other imaging and individual is a candidate for aggressive surgical resection or other localized treatment to metastasis for curative intent	• PET/CT (CPT® 78815)

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Background and Supporting Information

Small bowel adenocarcinoma is a rare gastrointestinal malignancy that frequently presents at an advanced stage and carries a risk of recurrence following treatment. Recurrence may manifest as locoregional disease or distant metastases, most commonly involving the liver, lymph nodes, peritoneum, and lungs. Accurate restaging is critical to guide management decisions, including systemic therapy or consideration of surgical intervention (NCCN, 2026).

Evidence Discussion

CT of the chest, abdomen, and pelvis with contrast is supported as the first-line imaging modality when recurrence of small bowel adenocarcinoma is suspected. Evidence demonstrates that CT provides comprehensive evaluation of the most common sites of metastatic disease, including the liver, lymph nodes, peritoneum, and lungs. This allows timely detection of recurrent or progressive disease and supports clinical decision-making, although repeated CT imaging carries risks of cumulative radiation exposure and contrast-related adverse effects (NCCN, 2026).

Serial CT imaging during systemic therapy is supported to evaluate treatment response in patients with unresected or metastatic disease. Imaging performed at defined treatment intervals enables assessment of disease progression or stability and guides decisions regarding continuation or modification of therapy. This approach improves the appropriateness of treatment selection, though it increases imaging frequency and associated risks (NCCN, 2026).

MRI of the abdomen is supported for further evaluation of inconclusive liver lesions identified on CT. Evidence indicates that MRI provides superior soft tissue contrast and improved characterization of hepatic lesions, enhancing diagnostic accuracy and facilitating assessment of resectability. This targeted use allows for more precise treatment planning while avoiding unnecessary broader imaging (NCCN, 2026).

PET/CT is supported as a problem-solving modality in select clinical scenarios, particularly when conventional imaging is negative or inconclusive despite clinical suspicion of recurrence. It may identify metabolically active disease, clarify ambiguous findings, and aid in selecting patients for aggressive interventions such as surgical resection or localized therapies with curative intent. However, limitations include false-positive findings, radiation exposure, and cost, supporting its selective rather than routine use (NCCN, 2026).

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Small Bowel Cancer – Surveillance/ Follow-up (ONC-16.7)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I-III small bowel cancer	• CT Chest (CPT® 71260) with contrast and CT Abdomen and Pelvis (CPT® 74177) with contrast after completion of surgery, and then annually for 5 years
Stage IV small bowel cancer - Metastatic disease (post definitive treatment of all measurable disease, or being observed off therapy)	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast every 6 months for 2 years and then annually for 3 years
Measurable metastatic disease on maintenance therapy in individuals with small bowel caner	Every 3 months for up to 5 years after completion of active treatment: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)

Background and Supporting Information

Small bowel adenocarcinoma is a rare malignancy with limited disease-specific data to guide surveillance strategies. As a result, post-treatment follow-up recommendations are largely extrapolated from colorectal cancer, particularly regarding imaging intervals and modalities (NCCN, 2026).

Following curative-intent treatment, recurrence may occur locoregionally or as distant metastatic disease, most commonly involving the liver, lymph nodes, peritoneum, and lungs. Cross-sectional imaging is central to surveillance because it enables detection of asymptomatic recurrence and assessment of disease progression (NCCN, 2026).

Evidence Discussion

Surveillance imaging following treatment of small bowel adenocarcinoma is supported by the risk of recurrence and the need for early detection of treatable disease. In

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the absence of disease-specific evidence, imaging strategies are extrapolated from colorectal cancer, supporting CT of the chest, abdomen, and pelvis after surgical resection and at defined intervals thereafter to detect recurrence (NCCN, 2026).

For stage I–III disease, imaging at completion of surgery followed by annual CT for five years is supported by the need to monitor for recurrence during the period of highest risk. This approach allows detection of asymptomatic disease and potential intervention, although it introduces cumulative radiation exposure and contrast-related risks over time (NCCN, 2026).

For patients with stage IV disease treated with curative intent or observed off therapy, more frequent imaging is supported to monitor for recurrence. Evidence supports CT imaging every 6 months for the first 2 years, followed by annual imaging, reflecting the higher risk of recurrence in this population and the potential benefit of early detection. Similarly, patients with measurable metastatic disease on maintenance therapy require more frequent imaging, with CT performed at shorter intervals (e.g., every 3 months) to assess disease status and guide ongoing management decisions (NCCN, 2026).

Overall, a risk-adapted surveillance strategy using CT imaging balances timely detection of recurrence with minimization of imaging-related harms. While more intensive imaging may improve detection of asymptomatic disease, the benefits must be weighed against increased radiation exposure, cost, and potential downstream interventions, supporting the guideline-recommended interval-based approach (NCCN, 2026).

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Renal Cell Cancer (RCC) (ONC-17)

Guideline

Renal Cell Cancer (RCC) – General Considerations (ONC-17.0)
Renal Cell Cancer (RCC) – Suspected/Diagnosis (ONC-17.1)
Renal Cell Cancer (RCC) – Initial Work-up/Staging (ONC-17.2)
Renal Cell Cancer (RCC) – Restaging/Recurrence (ONC-17.3)
Renal Cell Cancer (RCC) – Surveillance (ONC-17.4)
References (ONC-17)

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Renal Cell Cancer (RCC) – General Considerations (ONC-17.0)

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Criteria

- PET is considered not medically necessary for initial diagnosis, staging, restaging, or surveillance of renal cell cancer.
- A minority of adult individuals with renal cell cancer (RCC) will have translocations in TFE3 or TFEB, which have a different natural history than “adult type” RCC. Individuals of any age with TFE3 or TFEB translocated RCC should be imaged according to guidelines in **Pediatric Renal Cell Carcinoma (RCC) (PEDONC-7.4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Individuals of any age with a Wilms tumor should be imaged according to guidelines in section **Unilateral Wilms Tumor (UWT) (PEDONC-7.2)** or **Bilateral Wilms Tumor (BWT) (PEDONC-7.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Oncocytoma, papillary, and chromophobe in individuals of all ages should be imaged according to these guidelines.

Background and Supporting Information

Renal cell carcinoma (RCC) represents the majority of kidney malignancies and is most commonly clear cell histology, although multiple histologic and molecular subtypes exist with differing clinical behaviors (NCCN, 2026). Prognosis is largely determined by tumor stage, grade, extent of local invasion, and the presence of metastatic disease. RCC most frequently metastasizes to the lung, bone, liver, lymph nodes, adrenal gland, and brain, which informs imaging approaches for staging and follow-up (NCCN, 2026).

Evidence Discussion

The exclusion of PET imaging for routine diagnosis, staging, restaging, and surveillance of RCC is supported by evidence demonstrating limited sensitivity and specificity compared with CT and MRI. FDG uptake in RCC is variable, and physiologic renal excretion of tracer reduces accuracy for detecting primary tumors and small lesions. As a result, PET imaging does not reliably improve diagnostic performance over standard cross-sectional imaging and is not recommended for routine use (NCCN, 2026).

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Health Equity Considerations

Significant racial, ethnic, and socioeconomic disparities persist across the renal cell carcinoma (RCC) care continuum, influencing incidence, stage at diagnosis, treatment, and survival. Black Americans experience a higher incidence of RCC and worse overall survival compared with White individuals, disparities that are largely mediated by social determinants of health rather than tumor biology alone, including lower income, lower educational attainment, higher comorbidity burden, and lower rates of insurance coverage (Alam et al., 2023; Sims et al., 2018). Hypertension and chronic kidney disease, both more prevalent and more strongly associated with RCC risk among Black individuals, account for a substantial proportion of excess RCC incidence in this population, highlighting the downstream oncologic impact of structural inequities in chronic disease prevention and management (Callahan et al., 2021). Although Black individuals may present with earlier-stage disease, survival disparities remain after adjustment for stage and histology, underscoring inequities in access to timely, high-quality diagnostic evaluation and treatment (Alam et al., 2023; Sims et al., 2018).

Geographic, ethnic, and neighborhood-level factors further shape RCC outcomes. Hispanic individuals, particularly Mexican Americans, American Indians, and Alaska Natives, are more likely to present with advanced-stage RCC and experience higher RCC-specific mortality in certain regions of the United States, with disparities amplified in medically underserved, rural, and high-poverty areas (Liu et al., 2025; Valencia et al., 2021). These inequities are closely linked to barriers in health care access, including lack of insurance, long travel distances to specialty care, and residence in lower-resource neighborhoods, rather than consistent biologic differences (Valencia et al., 2021). Imaging-based evaluation plays a critical role in RCC detection and staging; therefore, equitable application of evidence-based imaging recommendations, coupled with attention to geographic access, socioeconomic context, and comorbidity burden, is essential to reduce disparities in RCC outcomes and to ensure high-value, individual-centered care across diverse populations (Alam et al., 2023; Liu et al., 2025).

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Renal Cell Cancer (RCC) – Suspected/ Diagnosis (ONC-17.1)

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Criteria

Indication	Medically Necessary Imaging Study
• Solitary renal mass suspicious for renal cell cancer	• See: **Indeterminate Renal Lesion (AB-35.1)** in the Abdomen Imaging Guidelines for evaluation of suspected renal malignancies • CT Chest with contrast with (CPT® 71260) or without contrast (CPT® 71250)

Evidence Discussion

In individuals with suspected or confirmed renal cell carcinoma (RCC), complete staging includes evaluation of the chest due to the high propensity for pulmonary metastases. The lung is the most common site of distant spread, and chest imaging is therefore essential at diagnosis to evaluate for metastatic disease (Mano et al., 2015; NCCN, 2026).

Cross-sectional imaging with CT of the chest is preferred over chest radiography (CXR) because of its higher sensitivity for detecting pulmonary nodules and early metastatic disease. Studies demonstrate that pulmonary nodules are frequently identified on preoperative CT imaging, occurring in approximately half of individuals with RCC, highlighting the importance of sensitive detection methods (Mano et al., 2015).

The clinical value of CT chest imaging lies in its ability to identify nodules that may represent metastatic disease and to risk stratify patients. While many indeterminate pulmonary nodules, particularly those 1cm or less, are not associated with disease progression, larger nodules (greater than 1cm) are significantly associated with subsequent development of metastases. Thus, CT imaging not only detects disease but also provides prognostic information that can influence clinical management (Mano et al., 2015).

Despite these benefits, CT imaging introduces considerations including radiation exposure and the potential for identifying indeterminate findings that may lead to additional testing. However, the ability of CT chest to more accurately detect clinically significant pulmonary metastases compared with CXR supports its preferred use for staging in suspected RCC. Overall, the evidence supports CT chest as the medically

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necessary imaging modality for staging due to its superior diagnostic performance and ability to guide management decisions (Mano et al., 2015; NCCN, 2026).

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Renal Cell Cancer (RCC) – Initial Work-up/Staging (ONC-17.2)

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Criteria

Indication	Medically Necessary Imaging study
All individuals with RCC	If not done previously: • CT Chest with (CPT® 71260) or without (CPT® 71250) contrast • CT Abdomen and Pelvis, contrast as requested
ANY of the following in individuals with RCC: • Extension of tumor into the vena cava by other imaging • Inconclusive findings on CT	• MRI Abdomen without and with contrast (CPT® 74183)
Bone pain in individuals with RCC	• Bone scan (CPT® 78306) (See: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)
EITHER of the following in individuals with RCC: • Signs/symptoms suspicious for brain metastases • Newly diagnosed stage IV/ metastatic RCC	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Renal cell carcinoma (RCC) accounts for the majority of kidney malignancies and arises from renal cortical tissue. More than 90% of kidney cancers are RCC, and over half of cases are detected incidentally through imaging performed for unrelated indications (Campbell et al., 2021). Prognosis is primarily determined by tumor stage, grade, and histologic subtype, and early-stage disease is often associated with favorable outcomes (Campbell et al., 2021; NCCN, 2026).

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Evidence Discussion

Cross-sectional imaging with contrast-enhanced CT or MRI of the abdomen and pelvis is supported as the primary modality for initial evaluation and staging of RCC because it allows detailed characterization of renal masses and assessment of local and regional disease. Evidence demonstrates that contrast-enhanced imaging provides critical information regarding tumor enhancement, complexity, and extent, including venous invasion and nodal involvement, as well as evaluation of adjacent organs and contralateral renal function (Campbell et al., 2021; NCCN, 2026). The benefit of this approach is improved diagnostic accuracy and staging, though risks include contrast exposure and radiation with CT.

Chest imaging is supported as a necessary component of staging due to the high frequency of pulmonary metastases in RCC. CT of the chest is preferred over chest radiography because of its greater sensitivity for detecting pulmonary nodules and early metastatic disease. This improves detection of clinically significant metastases and informs treatment planning, although it may identify indeterminate findings that require further evaluation (Campbell et al., 2021; NCCN, 2026).

MRI of the abdomen is supported as an adjunct modality in cases of inconclusive CT findings or when there is concern for venous involvement, such as tumor extension into the inferior vena cava. MRI provides superior soft tissue characterization and can clarify indeterminate findings, improving staging accuracy and surgical planning. Its use is targeted due to higher cost and resource utilization compared with CT (NCCN, 2026).

Additional imaging modalities are supported selectively based on clinical findings. Bone scans are recommended in individuals with bone pain or laboratory abnormalities, as the yield of detecting osseous metastases is low in asymptomatic patients. Similarly, brain imaging is reserved for those with neurologic symptoms or known metastatic disease, as central nervous system involvement is typically symptomatic. This risk-adapted strategy minimizes unnecessary imaging while maintaining sensitivity for clinically relevant metastatic disease (Campbell et al., 2021b NCCN, 2026).

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Renal Cell Cancer (RCC) – Restaging/ Recurrence (ONC-17.3)

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Criteria

Indication	Medically Necessary Imaging Study
Unresectable disease or metastatic disease on systemic therapy in individuals with RCC	Every 2 cycles of treatment (commonly every 6 to 8 weeks): • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis, contrast as requested (CPT® 74177, CPT® 74178, or CPT® 74176) • CT with contrast of other involved or symptomatic areas
Recurrence suspected in individuals with RCC	• CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis, contrast as requested (CPT® 74177, CPT® 74178, or CPT® 74176)
EITHER of the following in individuals with RCC: • Biopsy-proven recurrent/ metastatic disease • Signs or symptoms concerning for brain metastases	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Renal cell carcinoma (RCC) has a well-defined pattern of metastatic spread and recurrence following initial treatment. The most common metastatic sites include the lungs, lymph nodes (retroperitoneal and mediastinal), liver, bone, and brain. Recurrence may occur locally in the renal fossa or at distant sites and is influenced by initial stage, tumor biology, and treatment approach (Campbell et al., 2021).

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Evidence Discussion

CT of the chest, abdomen, and pelvis with contrast is supported as the primary imaging modality for evaluation of suspected recurrence in RCC. Evidence demonstrates that individuals with findings concerning for recurrent or metastatic disease should undergo comprehensive imaging of the chest and abdomen to assess for disease extent, as these regions encompass the most common sites of metastasis, including lung, lymph nodes, liver, and other visceral organs (Campbell et al., 2021). This approach enables accurate restaging and informs treatment decisions, although repeated CT imaging introduces cumulative radiation exposure and contrast-related risks.

Serial CT imaging is supported in individuals with unresectable or metastatic disease receiving systemic therapy. Imaging performed at regular intervals, such as every 2 cycles of treatment, allows assessment of tumor response, stability, or progression, which is critical for determining whether to continue, modify, or change therapy. This is particularly important given the evolving treatment landscape in metastatic RCC, where immunotherapy and targeted agents require close monitoring of disease dynamics (Barragán-Carrillo et al., 2025). While beneficial for treatment optimization, this approach increases imaging frequency and associated risks.

MRI of the brain is supported in individuals with suspected or confirmed metastatic disease who have neurologic symptoms or are at risk for central nervous system involvement. Evidence indicates that brain metastases are typically symptomatic, supporting a targeted imaging approach rather than routine screening. MRI provides high sensitivity for detection of intracranial metastases and guides management decisions such as radiation therapy or systemic treatment adjustments (Campbell et al., 2021).

Overall, the imaging strategy for restaging and recurrence in RCC emphasizes comprehensive CT-based evaluation with targeted use of additional modalities based on clinical presentation. This approach balances early detection of recurrent or progressive disease with minimization of unnecessary imaging, radiation exposure, and downstream interventions while supporting timely and appropriate treatment decisions.

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Renal Cell Cancer (RCC) – Surveillance (ONC-17.4)

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Criteria

Indication	Medically Necessary Imaging Study
Renal neoplasm or suspected RCC on active surveillance of renal mass less than 1cm	ALL of the following, once within 6 months of surveillance initiation and annually thereafter: • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150) or MRI Abdomen without and with contrast (CPT® 74183) • Chest x-ray ◦ CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) is medically necessary instead of chest x-ray for any of the following: ▪ Known prior thoracic disease ▪ New or worsening pulmonary symptoms ▪ New or worsening chest x-ray findings For known pulmonary nodule, see **Lung Metastases (ONC-31.1)**
Renal neoplasm or suspected RCC on active surveillance of renal mass ≥1cm	ALL of the following, every 3 months for year 1, every 6 months for years 2 and 3 and annually thereafter: • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150) OR MRI Abdomen without and with contrast (CPT® 74183) • Chest x-ray ◦ CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) is medically necessary instead of chest x-ray for any of the following: ▪ Known prior thoracic disease ▪ New or worsening pulmonary symptoms ▪ New or worsening chest x-ray findings For known pulmonary nodule, see **Lung Metastases (ONC-31.1)**

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Indication	Medically Necessary Imaging Study
Follow up after post-ablation therapy of RCC	Annually for 5 years: • CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) AND at 1 to 3 months, 6 months, and 12 months post-ablation and then annually thereafter: • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150) or • MRI Abdomen without and with contrast (CPT® 74183)
Follow up in individuals with RCC after SBRT	ONE of each of the following, every 3 months for 1 year, every 6 months in year 2, every 9 months in years 3-4, and once in year 5 (to complete 5 years surveillance): • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150) or MRI Abdomen without and with contrast (CPT® 74183)
Stage I RCC, after partial or radical nephrectomy	ONE of each of the following, 3 to 12 months post-resection: • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150) or MRI Abdomen without and with contrast (CPT® 74183) ONE of each of the following, annually for 5 years: • CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast • MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150)

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Indication	Medically Necessary Imaging Study
Stage II RCC, post-nephrectomy	ONE of each of the following, 3 to 6 months post-resection: • CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150), or CT Abdomen and Pelvis, contrast as requested (CPT® 74177, CPT® 74176, or CPT® 74178), or MRI Abdomen without and with contrast (CPT® 74183) +/- MRI Pelvis without and with contrast (CPT® 72197) ONE of each of the following, every 6 months for 2 years, then annually until year 5: • CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast • MRI Abdomen without and with contrast (CPT® 74183) +/- MRI Pelvis without and with contrast (CPT® 72197), or CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150), or CT Abdomen and Pelvis, contrast as requested (CPT® 74177, CPT® 74176, CPT® 74178)
Stage III RCC, post-nephrectomy	ONE of each of the following, 3 to 6 months post-resection: • CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150), or CT Abdomen and Pelvis, contrast as requested (CPT® 74177, CPT® 74176, or CPT® 74178), or MRI Abdomen without and with contrast (CPT® 74183) +/- MRI Pelvis without and with contrast (CPT® 72197) ONE of each of the following, every 3 months for 3 years, then annually to year 5: • CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150), or CT Abdomen and Pelvis, contrast as requested (CPT® 74177, CPT® 74176, CPT® 74178), or MRI Abdomen without and with contrast (CPT® 74183) +/- MRI Pelvis without and with contrast (CPT® 72197)

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Indication	Medically Necessary Imaging Study
Stage IV/ metastatic RCC on maintenance therapy or being observed off therapy	ONE of each of the following, every 3 months for up to 5 years after completion of active treatment: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen, contrast as requested (CPT® 74170, CPT® 74160, or CPT® 74150), or CT Abdomen and Pelvis contrast as requested (CPT® 74177, CPT® 74176, or CPT® 74178), or MRI Abdomen without and with contrast (CPT® 74183) +/- MRI Pelvis without and with contrast (CPT® 72197)

Background and Supporting Information

Renal cell carcinoma (RCC) demonstrates variable risk of recurrence following treatment, with recurrence risk strongly associated with tumor stage, grade, and other clinicopathologic factors. In individuals treated with curative intent for localized disease, recurrence occurs in approximately 20%–30% of cases within 5 years, with both local and distant patterns of spread observed (Dabestani et al., 2019; NCCN, 2026).

Surveillance strategies are designed to detect recurrence at an early and potentially curable stage, particularly for individuals with limited or oligometastatic disease who may benefit from metastasis-directed therapies. However, recurrence patterns vary significantly by risk group, with low-risk individuals experiencing fewer and later recurrences, and high-risk patients demonstrating earlier and more frequent recurrence (Dabestani et al., 2019).

Evidence Discussion

Surveillance imaging following treatment of RCC is supported by the risk of recurrence, particularly within the first five years after surgery, when most recurrences occur. Evidence demonstrates recurrence rates of approximately 20%–30% during this period, supporting structured follow-up protocols with imaging to detect potentially curable disease (Dabestani et al., 2019). Early detection of isolated or oligometastatic recurrence may allow for curative interventions, though the overall proportion of patients achieving long-term disease-free survival after recurrence remains limited.

Risk-adapted imaging strategies are supported by differences in recurrence patterns across disease stages. Low-risk patients have relatively low recurrence rates and later onset of recurrence, supporting less frequent imaging. In contrast, intermediate- and high-risk patients have higher and earlier recurrence rates, particularly within the first 2–3 years after surgery, supporting more intensive imaging during this period (Dabestani

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et al., 2019; NCCN, 2026). This stratified approach improves detection of clinically significant recurrence while minimizing unnecessary imaging in lower-risk populations.

Cross-sectional imaging with CT or MRI of the abdomen and CT or chest x-ray of the thorax is supported for surveillance due to the distribution of metastatic disease, with the lungs and abdomen representing the most common sites. Chest imaging is particularly important for detecting pulmonary metastases, while abdominal imaging allows evaluation of the renal fossa, contralateral kidney, and common visceral metastatic sites (NCCN, 2026). However, repeated imaging introduces cumulative risks, including radiation exposure, contrast toxicity, and increased healthcare utilization.

More intensive surveillance, including frequent imaging, has not consistently demonstrated improved overall survival, particularly in high-risk patients where recurrence is often multifocal and less amenable to curative treatment. Evidence indicates that while surveillance may detect recurrence earlier, this does not always translate into cure or improved long-term outcomes, especially in patients with widespread disease (Dabestani et al., 2019). Therefore, guideline-supported surveillance intervals aim to balance early detection of treatable recurrence with avoidance of excessive imaging, emphasizing a risk-based, individualized approach.

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Transitional Cell Cancer (ONC-18)

Guideline

Transitional Cell Cancer – General Considerations (ONC-18.0)
Transitional Cell Cancer – Suspected/Diagnosis (ONC-18.1)
Transitional Cell Cancer – Initial Work-up/Staging (ONC-18.2)
Transitional Cell Cancer – Restaging/Recurrence (ONC-18.3)
Transitional Cell Cancer – Surveillance/Follow-up (ONC-18.4)
References (ONC-18)

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Transitional Cell Cancer – General Considerations (ONC-18.0)

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Criteria

- Transitional cell cancers can include: tumors of the bladder, ureters, prostate, urethra, or renal pelvis. For primary cancer of the kidney, see: **Renal Cell Cancer (RCC) (ONC-17)**.
- Most common histology of bladder cancer is transitional cell (TCC) or urothelial carcinoma (UCC). Rare histologies include adenocarcinoma, squamous cell (imaged according to **Transitional Cell Cancer (ONC-18)**), or small cell (imaged according to **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)**).
- Urachal cancer is rare type of bladder cancer; the most common histology is adenocarcinoma. These are imaged according to muscle invasive bladder cancer.
- PET is not medically necessary in transitional cell cancer with exception noted below in **Transitional Cell Cancer – Initial Work-up/Staging (ONC-18.2)**.

Background and Supporting Information

Transitional cell carcinoma (TCC), also referred to as urothelial carcinoma (UCC), arises from the urothelial lining of the urinary tract and may involve the bladder, ureters, renal pelvis, urethra, or prostate. Urothelial carcinoma represents the predominant histologic subtype of bladder cancer and accounts for the majority of malignancies arising in the urinary tract epithelium (NCCN, 2026).

Bladder cancer is the most common presentation of urothelial carcinoma, with disease categorized into non-muscle-invasive bladder cancer (NMIBC), muscle-invasive bladder cancer (MIBC), and metastatic disease. These categories are clinically relevant because they reflect differences in tumor biology, risk of progression, recurrence patterns, and treatment approaches (NCCN, 2026).

Histologic subtypes beyond conventional urothelial carcinoma exist, including tumors with squamous or glandular differentiation, as well as pure non-urothelial histologies such as adenocarcinoma, squamous cell carcinoma, and neuroendocrine tumors. These variants may have different clinical behavior and may require distinct management approaches, particularly for aggressive subtypes or rare entities such as small cell carcinoma or urachal tumors (NCCN, 2026).

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Health Equity Considerations

Transitional cell carcinoma (TCC) of the urinary system demonstrates marked disparities in incidence, stage at diagnosis, treatment, and survival that have important health equity implications. Population-based data from the SEER database show that outcomes vary substantially by anatomic location, with bladder TCC associated with earlier stage at diagnosis and more favorable survival, while upper tract urothelial carcinomas (UTUC), including renal pelvis and ureteral TCC, are more frequently diagnosed at advanced stages and have significantly worse overall and cancer-specific survival (Tang et al., 2023). These differences are not solely attributable to tumor biology but are strongly influenced by diagnostic limitations, access to timely evaluation, and challenges inherent in staging and treating upper tract disease, which may disproportionately affect older adults and medically complex patients (Tang et al., 2023).

Demographic patterns further underscore equity concerns in TCC. TCC disproportionately affects older adults and males, while racial and ethnic minority populations, including Black, Hispanic, American Indian/Alaska Native, and Asian/Pacific Islander individuals, remain underrepresented in subgroup analyses, limiting the ability to fully characterize and address disparities in these populations (Tang et al., 2023). Variations in surgical and adjuvant therapy utilization across tumor sites suggest potential differences in access to specialized care, imaging, and multidisciplinary management, particularly for UTUC, where lower rates of surgery and delayed diagnosis may worsen outcomes (Tang et al., 2023). Imaging plays a central role in detection, staging, and surveillance of TCC; therefore, equitable application of guideline-directed imaging that accounts for patient age, comorbidity burden, and anatomic site is essential to reduce disparities, support early diagnosis, and improve outcomes across all populations affected by transitional cell carcinoma (Tang et al., 2023).

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Transitional Cell Cancer – Suspected/ Diagnosis (ONC-18.1)

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- See: **Hematuria and Hydronephrosis (AB-39)** in the Abdomen Imaging Guidelines for evaluation of suspected transitional cell malignancies.

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Transitional Cell Cancer – Initial Work-up/Staging (ONC-18.2)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with transitional cell cancer, both muscle invasive and non-muscle invasive	ONE of the following: • CT Abdomen and Pelvis without and with contrast (CPT® 74178) ◦ MRI Abdomen (CPT® 74183) without and with contrast and MRI Pelvis (CPT® 72197) without and with contrast if contraindication to CT contrast • CT Abdomen and Pelvis without contrast (CPT® 74176) with retrograde pyelogram or renal ultrasound (CPT® 76770 or CPT® 76775) in individuals who cannot receive either CT or MRI contrast
Sessile or high-grade tumors	In addition to the imaging above, if not already performed: • MRI Pelvis without and with contrast (CPT® 72197)
ANY of the following in individuals with transitional cell cancer: • Muscle invasive bladder carcinoma • Urethral carcinoma • Urothelial carcinoma of the prostate	• CT Chest without (CPT® 71250) or with (CPT® 71260) contrast
Individuals without metastatic transitional cell cancer, when requested by operating surgeon for operative planning	• CT with contrast or MRI without and with contrast of all operative sites

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Indication	Medically Necessary Imaging Study
Evaluation of suspected bone metastasis in individuals with transitional cell cancer: • Individuals with symptoms of bone metastasis • Laboratory indicators of bone metastasis • Individuals with muscle invasive disease • Suspected sites of extra-osseous metastatic disease	Any ONE of the following: • Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology [ONC-1.3]** for additional bone scan codes) • MRI without and with contrast of areas of suspected involvement • FDG PET/CT (CPT® 78815)
To evaluate inconclusive findings on conventional imaging in individuals with transitional cell cancer	• PET/CT (CPT® 78815)
Suspected brain metastases in individuals with transitional cell cancer	See: **Brain Metastases (ONC-31.3)**

Background and Supporting Information

Transitional cell carcinoma (TCC), or urothelial carcinoma (UCC), arises from the urothelial lining of the urinary tract and may involve the bladder, ureters, renal pelvis, urethra, or prostate. The disease is categorized into non–muscle-invasive and muscle-invasive forms, which differ in risk of progression, recurrence, and metastatic potential. These distinctions are central to determining appropriate imaging strategies for staging and treatment planning (NCCN, 2026).

Evidence Discussion

Cross-sectional imaging of the abdomen and pelvis with contrast is supported as the foundation of initial staging in transitional cell carcinoma because it enables comprehensive evaluation of both the upper and lower urinary tracts. CT urography provides detailed anatomic assessment, including visualization of the collecting system and detection of tumors, obstruction, or lymphadenopathy. Evidence demonstrates that multiphase CT imaging improves detection and characterization of urothelial tumors while also assessing regional and distant disease (NCCN, 2026; Coleman et al., 2023).

MRI is supported as an alternative in individuals unable to receive iodinated contrast or when further characterization is required. MRI provides excellent soft tissue contrast for local staging, particularly for evaluation of tumor invasion in sessile or high-grade lesions. However, it may be limited by motion artifact and lower sensitivity for certain

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urothelial lesions compared with CT. The absence of ionizing radiation is a key benefit, particularly for patients requiring repeated imaging (NCCN, 2026).

In individuals who cannot receive either CT or MRI contrast, the combination of non-contrast imaging with retrograde pyelography or ultrasound is supported to ensure adequate evaluation of the urinary tract. Ultrasound alone is insufficient due to limited visualization of the ureters and collecting system; therefore, adjunctive techniques are required for complete assessment (NCCN, 2026; Coleman et al., 2023).

Chest imaging is supported in individuals with muscle-invasive bladder cancer or other high-risk urothelial malignancies because of the increased likelihood of pulmonary metastases. CT chest provides higher sensitivity than radiography for detecting metastatic disease, improving staging accuracy and guiding treatment decisions. Conversely, in non–muscle-invasive disease, routine chest imaging is not necessary due to low metastatic risk, supporting a risk-adapted approach (NCCN, 2026).

Additional imaging modalities are used selectively based on clinical indications. Bone imaging is supported in individuals with symptoms or laboratory evidence suggestive of osseous metastases and in those with muscle-invasive disease, reflecting the higher risk of metastatic spread. FDG PET/CT is not routinely recommended for initial staging because it does not adequately delineate urinary tract anatomy; however, it may serve as a problem-solving tool in cases of inconclusive findings on conventional imaging (NCCN, 2026).

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Transitional Cell Cancer – Restaging/ Recurrence (ONC-18.3)

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Criteria

Indication	Medically Necessary Imaging Study
After definitive surgery in individuals with transitional cell cancer	• CT Chest with contrast (CPT® 71260) AND • CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen and Pelvis without and with contrast (CPT® 74178) for post-operative baseline ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast if contraindication to CT contrast
Recurrence suspicion in individuals with transitional cell cancer	• CT Chest with contrast (CPT® 71260) AND • CT Abdomen and Pelvis with contrast (CPT® 74177) or with and without contrast (CPT® 74178) ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast if contraindication to CT contrast
After neoadjuvant therapy and before resection in individuals with transitional cell cancer	• CT Chest with contrast (CPT® 71260) and CT Urogram (CPT® 74178)
Monitoring therapy for metastatic disease in individuals with transitional cell cancer	Every 2 cycles of therapy: • CT Chest with contrast (CPT® 71260) AND • CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast if contraindication to CT contrast

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Indication	Medically Necessary Imaging Study
To evaluate inconclusive findings on conventional imaging in individuals with transitional cell cancer	• PET/CT (CPT® 78815)

Background and Supporting Information

Urothelial carcinoma (transitional cell carcinoma) has a significant risk of recurrence and progression following definitive therapy, particularly in individuals with muscle-invasive disease. Recurrence may be local (pelvic or bladder bed), regional (lymph nodes), or distant, with common metastatic sites including the lungs, liver, bone, and peritoneum (Holzbeierlein et al., 2024; NCCN, 2026).

The risk of recurrence is dependent on tumor stage and pathologic features. In patients with muscle-invasive bladder cancer undergoing cystectomy, systemic recurrence rates range from approximately 20% in lower-stage disease to greater than 50% in advanced stages, and most recurrences occur within the first 2–3 years after treatment (Holzbeierlein et al., 2024).

Evidence Discussion

Cross-sectional imaging with CT of the abdomen and pelvis is supported for both baseline post-operative evaluation and assessment of suspected recurrence because it provides comprehensive visualization of the urinary tract, regional lymph nodes, and common sites of metastatic spread. Evidence indicates that CT imaging can effectively evaluate tumor extent, detect nodal disease, and identify distant metastases, which are most commonly found in lymph nodes, bone, lungs, liver, and peritoneum (Holzbeierlein et al., 2024; NCCN, 2026). This enables accurate restaging and informs management decisions, although it exposes patients to ionizing radiation and contrast-related risks.

The recommendation that restaging imaging mirrors initial staging is supported by the similar diagnostic requirements in both settings. Cross-sectional imaging remains necessary to evaluate disease burden, detect recurrence, and assess progression. Studies of imaging modalities demonstrate that CT, particularly with contrast enhancement, provides high sensitivity for identifying tumor recurrence and metastatic disease, especially when combined with multiphasic techniques that improve visualization of tumor extent and surrounding structures (Wang et al., 2004; NCCN, 2026).

Chest imaging is supported selectively in individuals with risk factors for thoracic metastases, including prior thoracic disease, pulmonary symptoms, or muscle-invasive

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disease. This targeted approach reflects the higher likelihood of pulmonary involvement in advanced disease while avoiding unnecessary imaging in lower-risk patients. CT chest provides greater sensitivity than chest radiography for detection of pulmonary metastases, improving staging accuracy and treatment planning (Holzbeierlein et al., 2024).

Serial imaging during systemic therapy is supported to assess treatment response in patients with metastatic disease. Imaging performed at defined intervals, such as every 2 cycles, allows evaluation of tumor burden and guides decisions regarding continuation or modification of therapy. While this approach improves treatment monitoring, it increases the frequency of imaging and associated risks, including radiation exposure and cost (Holzbeierlein et al., 2024; NCCN, 2026).

PET/CT is supported as a problem-solving modality when conventional imaging is inconclusive. Evidence suggests that while PET/CT does not provide detailed anatomic assessment of the urinary tract and is therefore not useful for routine staging, it may help clarify equivocal findings or identify metabolically active disease. This selective use balances its diagnostic benefit with limitations including cost, radiation exposure, and reduced utility for primary tumor visualization (NCCN, 2026).

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Transitional Cell Cancer – Surveillance/ Follow-up (ONC-18.4)

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Criteria

Indication	Medically Necessary Imaging Study
ANY of the following in individuals with non-muscle invasive transitional cell carcinoma of the bladder (NMIBC): • Low risk lesions ◦ Papillary urothelial neoplasm of low malignant potential ◦ Solitary Ta lesions 3 cm or less • Intermediate risk lesions ◦ Low-grade greater than 3cm ◦ Low-grade (G1-G2) multifocal ◦ High-grade solitary Ta ≤3cm ◦ Recurrence within 1 year, low-grade Ta ◦ Low-grade T1 ◦ Any Ta Grade 2 tumor	One-time baseline imaging at the end of therapy: • CT Urogram (CPT® 74178) or MR Urogram (CPT® 74183 and CPT® 72197) • Non-contrast CT Abdomen and Pelvis (CPT® 74176) can be substituted if individual cannot receive iodinated contrast nor gadolinium • Further advanced imaging is not routinely considered medically necessary for surveillance

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Indication	Medically Necessary Imaging Study
ANY of the following high-risk non-muscle invasive transitional cell carcinoma of the bladder (high-risk NMIBC) or upper tracts: • Multifocal high-grade lesions • High-grade lesions >3cm • BCG unresponsive • Lymphovascular invasion • Prostatic urethral invasion • High-grade T1 • Any recurrent, high-grade Ta • Carcinoma in situ • Variant histologies (micropapillary, plasmacytoid, small cell/ neuroendocrine, and sarcomatoid)	• CT Urogram (CPT® 74178) or MR Urogram (CPT® 74183 and CPT® 72197) (imaging as performed at initial staging) at end of therapy, then every 1-2 years for 10 years • Non-contrast CT Abdomen and Pelvis (CPT® 74176) can be substituted if individual cannot receive iodinated contrast nor gadolinium
Non-muscle-invasive transitional carcinoma of the bladder (NMIBC) treated with cystectomy	• CT Urogram (CPT® 74178) or MR Urogram (CPT® 74183 and CPT® 72197) (imaging as performed at initial staging) at 3 and 12 months post-cystectomy, and then annually for years 2-5 • Non-contrast CT Abdomen and Pelvis (CPT® 74176) can be substituted if individual cannot receive iodinated contrast nor gadolinium
Muscle invasive lower and upper genitourinary tumors treated with cystectomy, nephrectomy, or chemoradiation	Every 3-6 months for 2 years, then annually for 3 more years: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250), and CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) OR • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250), and MR Urogram (CPT® 74183 and CPT® 72197)

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Indication	Medically Necessary Imaging Study
Measurable metastatic disease on maintenance therapy or being monitored off therapy in individuals with transitional cell cancer	Every 3 months for up to 5 years after completion of active treatment: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177), CT Urogram (CPT® 74178), or MR Urogram (CPT® 74183 and CPT® 72197) (imaging as performed at initial staging)
Urethral cancers (high-risk T1 or greater) and urothelial carcinoma of the prostate	Every 3-6 months for 2 years, then annually: • CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) OR • MR Urogram (CPT® 74183 and CPT® 72197) AND • Chest x-ray ◦ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for any of the following: ▪ Signs/symptoms of pulmonary disease ▪ Abnormal chest x-ray ▪ Prior involvement of the chest

Background and Supporting Information

Transitional cell carcinoma (urothelial carcinoma) demonstrates a high rate of recurrence across all stages, particularly in non-muscle-invasive bladder cancer (NMIBC), where recurrence and progression risk vary significantly by tumor grade, size, and multifocality. Risk stratification into low-, intermediate-, and high-risk groups is central to determining appropriate surveillance intensity and imaging strategies (Holzbeierlein et al., 2024; NCCN, 2026).

Low-risk NMIBC is characterized by relatively high recurrence but very low rates of progression, whereas high-risk disease demonstrates both frequent recurrence and a higher likelihood of progression to muscle-invasive or metastatic disease. These differences in natural history justify a risk-adapted surveillance approach, balancing early detection of clinically significant recurrence with avoidance of unnecessary imaging (Holzbeierlein et al., 2024).

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Following definitive therapy for muscle-invasive disease, recurrence most commonly occurs within the first 2–3 years and may involve local, regional, or distant sites such as lymph nodes, lungs, liver, and bone. Surveillance imaging therefore focuses on early detection of recurrent or metastatic disease to guide timely intervention (Holzbeierlein et al., 2024; NCCN, 2026).

Evidence Discussion

A risk-adapted approach to surveillance imaging in urothelial carcinoma is supported by the heterogeneous natural history of disease. Evidence demonstrates that individuals with low-risk NMIBC have a high rate of recurrence but low likelihood of progression, supporting limited imaging beyond an initial baseline evaluation. Routine upper tract imaging is not recommended in asymptomatic individuals after baseline because the likelihood of clinically significant findings is low, and additional imaging may increase costs and unnecessary radiation exposure (Holzbeierlein et al., 2024; NCCN, 2026). In contrast, intermediate- and high-risk NMIBC are associated with increased risk of recurrence and progression, supporting periodic surveillance imaging. Evidence supports the use of CT urography or MR urography at defined intervals (e.g., every 1–2 years) to evaluate the upper urinary tract for recurrence or progression. This approach improves detection of clinically significant disease while limiting overuse of imaging in lower-risk populations (Holzbeierlein et al., 2024; NCCN, 2026).

Following definitive treatment of muscle-invasive disease, recurrence risk is highest within the first 2–3 years, justifying more intensive surveillance during this period. Cross-sectional imaging of the chest, abdomen, and pelvis enables detection of both local and distant recurrence, which may occur in lymph nodes, lungs, liver, or bone. Serial imaging at shorter intervals early in follow-up facilitates timely identification of recurrence and informs therapeutic decision-making, although it increases cumulative exposure to radiation and contrast agents (Holzbeierlein et al., 2024; NCCN, 2026).

In individuals with metastatic disease on maintenance therapy or observation, frequent imaging (e.g., every 3 months) is supported to monitor treatment response and detect progression. This allows clinicians to adjust therapy based on disease dynamics. However, this approach must balance the clinical benefit of close monitoring with the potential harms of repeated imaging, including cost, patient burden, and cumulative radiation exposure (Holzbeierlein et al., 2024; NCCN, 2026).

Chest imaging is used selectively in surveillance, particularly for individuals with higher-risk disease or symptoms suggestive of pulmonary involvement. Evidence indicates that routine chest imaging is not necessary in low-risk NMIBC but is appropriate in higher-risk groups given the increased likelihood of metastatic spread. This selective strategy optimizes diagnostic yield while minimizing unnecessary imaging (NCCN, 2026).

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Prostate Cancer (ONC-19)

Guideline

Prostate Cancer – General Considerations (ONC-19.0)
Suspected Prostate Cancer (ONC-19.1)
Prostate Cancer – Initial Work-up/Staging (ONC-19.2)
Prostate Cancer – Restaging/Recurrence (ONC-19.3)
Prostate Cancer – Follow-up On Active Surveillance (ONC-19.4)
Surveillance/Follow-up For Treated Prostate Cancer (ONC-19.5)
References (ONC-19)

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Prostate Cancer – General Considerations (ONC-19.0)

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Criteria

- Prostate cancer screening begins at age 45 for individuals at average risk of prostate cancer. However, individuals at high-risk may begin screening at age 40. High-risk features include:
  - Black/African American identity
  - germline mutations (BRCA1 or 2, HOXB13, ATM, CHEK2, or mismatch repair genes (MLH1, MSH2, MSH6, PMS2) that increase the risk of prostate cancer
  - family history of first or second-degree relative with prostate, male breast, colorectal, pancreatic, endometrial or female breast cancer at age under 45 years
- Treatment of benign prostatic hyperplasia with 5-alfa reductase inhibitors (such as finasteride and dutasteride) can falsely reduce the measured PSA levels by 50%. Thus, the reported PSA level should be doubled when prostate cancer is suspected in individuals on these medications.
- Individuals with high-risk adverse clinical and pathological factors may benefit from a more aggressive diagnostic and therapeutic approach at the time of relapse after initial treatment. These factors include pre-treatment Gleason score of 8 or higher, pre-treatment clinical stage of cT3b or higher, positive surgical margins, post-treatment PSA doubling time of less than 3 months, and an interval to biochemical failure of less than 3 years after initial treatment.
- PET/CT scans using ^{18}F-FDG radiotracer are considered not medically necessary for evaluation of prostate cancer.
- ^{11}C Choline, ^{18}F-Fluciclovine (AXUMIN®), and PSMA-specific radiopharmaceuticals have recently gained FDA approval for evaluation of prostate cancer. Optimal detection rates for these radiotracers vary greatly with PSA levels. False positive rate is high and histological confirmation of positive sites is recommended.
- PSMA-specific PET radiopharmaceuticals that are currently FDA-approved and considered medically necessary in prostate cancer are: ^{68}Ga PSMA-11 (UCSF & UCLA), ^{18}F Piflufolastat (Pylarify®), ^{18}F Flotufolastat (Posluma®), and ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®).
- As high-intensity focused ultrasound prostate ablation is considered investigational and experimental at this time, advanced imaging for treatment planning and/or surveillance of high intensity focused ultrasound prostate ablation is not considered medically necessary.

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- MR Spectroscopy (CPT® 76390) is considered not medically necessary in the evaluation of prostate cancer at this time.
- As laser prostate ablation is considered investigational and experimental at this time, advanced imaging for treatment planning and/or surveillance of laser prostate ablation is considered not medically necessary.
- Monitoring an elevated prostate-specific antigen level (PSA) with serial MRI is not considered medically necessary for suspected prostate cancer.
- Requests for imaging based on PSA must provide a recent PSA.

ISUP Prostate Cancer Grade Groups

Grade Group	Gleason Score	Gleason Pattern
1	≤6	≤3+3
2	7	3+4
3	7	4+3
4	8	4+4, 3+5, 5+3
5	9 or 10	4+5, 5+4, or 5+5

NCCN Initial Risk Stratification

- Low Risk
  - ALL of the following features are present:
    - Clinical T Stage = cT1-cT2a (palpable tumor limited to 1/2 or less of one side)
    - PSA (ng/mL) less than 10
    - Gleason Grade Group = 1
- Intermediate Risk
  - No "high-risk" or "very high-risk" features and one or more of the following **intermediate risk factors (IRFs)**:
    - cT2b-cT2c
    - Grade group 2 or 3
    - PSA 10-20 ng/mL
  - Favorable Intermediate Risk
    - ALL of the following features must be present:
      - Only 1 IRF
      - Gleason Grade Group = 1 or 2

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        - Less than 50% biopsy cores positive (e.g., less than 6 of 12 cores)
    - Unfavorable Intermediate Risk
        - One or more of the following must be present:
            - 2 or 3 IRFs
            - Gleason grade group = 3
            - 50% or more of biopsy cores positive (e.g., 6 or more of 12 cores)
- High-Risk
    - ONE or more of the following high-risk features is present:
        - Clinical T Stage = cT3-cT4
        - PSA (ng/mL) greater than 20
        - Gleason Grade Group = 4 or 5
- Very High-Risk
    - At least TWO of the following features is present:
        - Clinical T stage = cT3-cT4 (extension into the seminal vesicles or invasion into adjacent structures)
        - Primary Gleason Pattern = 5
        - Gleason Grade Group = 4 or 5
        - PSA (ng/mL) greater than 40

3D Rendering of MRI for MRI / Ultrasound Fusion Biopsy Criteria:

- When specific target lesion(s) is (are) detected on multi-parametric MRI (mpMRI) prostate and classified as PIRADS 3, 4, or 5, 3D Rendering (CPT® 76377) to generate prostate segmentation data image set for target identification on MRI/ Transrectal ultrasound (TRUS) fusion biopsy is considered medically necessary as:
    - a subsequent separate standalone request; or
    - a retrospective request for medical necessity
- For MRI/TRUS fusion biopsy of a PIRADS 1-2 lesion, approval of 3D rendering at independent workstation (CPT® 76376 or CPT® 76377) can be considered on a case-by-case basis.
- If there is no target lesion identified on MRI, then 3D rendering and MRI/TRUS fusion biopsy is generally not considered medically necessary.
- The 3D rendering for the TRUS component of the fusion is a part of the UroNav Fusion Equipment Software and an additional 3D code CPT® 76376 or CPT® 76377 is not considered medically necessary.

Background and Supporting Information

Prostate cancer is the most commonly diagnosed malignancy among individuals with a prostate and represents a spectrum of disease ranging from indolent tumors that may not require treatment to aggressive cancers associated with significant morbidity and

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mortality (NCCN, 2026). Risk stratification based on clinical stage, prostate-specific antigen (PSA), and Gleason Grade Group is fundamental to disease classification and guides diagnostic evaluation and management.

Early detection relies primarily on PSA-based screening, with digital rectal examination (DRE) used as an adjunctive tool. PSA is not cancer-specific and can be influenced by benign conditions or medications, including 5α-reductase inhibitors, which can significantly reduce PSA levels and impact interpretation (NCCN, 2026). Screening decisions incorporate age, life expectancy, and individual risk factors such as family history, germline mutations, and ancestry.

Evidence Discussion

PSA-based screening is supported by randomized clinical trial data demonstrating a reduction in prostate cancer-specific mortality in screened populations. Trials such as the ERSPC showed a significant decrease in prostate cancer deaths among screened individuals, supporting the role of early detection in reducing disease-specific mortality. However, screening also increases detection of indolent cancers that may not require treatment, emphasizing the importance of risk stratification and shared decision-making to mitigate overtreatment (NCCN, 2026).

Identification of high-risk populations supports earlier and more targeted screening strategies. Individuals with family history, germline mutations, and Black/African American identity have higher incidence, earlier onset, and increased mortality from prostate cancer. Evidence indicates these populations may derive greater benefit from screening, justifying earlier initiation and more vigilant monitoring despite potential risks of overdiagnosis (NCCN, 2026).

PSA testing has inherent limitations that impact its clinical utility. PSA is not cancer-specific and may be elevated due to benign conditions, resulting in false-positive findings and unnecessary biopsies. Conversely, clinically significant prostate cancer can occur even at low PSA levels. Medications such as 5α-reductase inhibitors can significantly reduce PSA values, potentially masking disease if not appropriately accounted for, introducing risk for delayed diagnosis (NCCN, 2026).

Advances in imaging and diagnostic techniques, including multiparametric MRI and MRI-targeted biopsy, improve the balance of benefits and harms by increasing detection of clinically significant cancers while reducing identification of low-risk disease and unnecessary biopsies. Although newer molecular imaging modalities such as PSMA PET demonstrate improved sensitivity, their use is limited by variable detection rates and false positives, and earlier detection of recurrence has not been shown to consistently improve overall survival. These findings support a selective, risk-adapted imaging approach aligned with guideline recommendations (NCCN, 2026).

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Health Equity Considerations

Prostate cancer demonstrates substantial and persistent disparities across the continuum of care, with Black men bearing a disproportionate burden of disease characterized by higher incidence, earlier onset, more aggressive tumor biology, and significantly higher mortality compared with other racial and ethnic groups (Cobbs et al., 2025; Gardner et al., 2025). These inequities are driven by an interplay of social determinants of health, structural racism, and healthcare system barriers, including lower rates of prostate-specific antigen (PSA) screening, delayed diagnostic evaluation, reduced access to advanced imaging such as multiparametric MRI, and underutilization of targeted biopsy techniques (Cobbs et al., 2025; Gardner et al., 2025). Socioeconomic status, insurance coverage, geographic location, and medical mistrust further compound these challenges, contributing to later-stage diagnoses and limiting opportunities for curative intervention, particularly among Black men, rural populations, and individuals with lower income or educational attainment (Gardner et al., 2025).

Disparities also extend into treatment selection, imaging surveillance, and access to precision medicine. Black men and other underserved populations are less likely to receive guideline-concordant imaging, definitive local therapy, advanced radiation modalities, and emerging theranostic or radiogenomic approaches, despite evidence that outcomes are comparable, or sometimes superior, when care is delivered in equal-access systems (Cobbs et al., 2025; Gardner et al., 2025). Underrepresentation of racial and ethnic minorities in clinical trials and genomic databases limits the generalizability of evidence used to guide imaging and treatment decisions, potentially reinforcing inequities as novel technologies are adopted (Cobbs et al., 2025). Equitable implementation of prostate cancer imaging emphasizing risk-adapted screening, timely diagnostic imaging, culturally competent patient engagement, and consistent access to advanced technologies is essential to reducing disparities and improving outcomes across diverse populations (Cobbs et al., 2025; Gardner et al., 2025).

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Suspected Prostate Cancer (ONC-19.1)

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Criteria

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Indication	Medically Necessary Imaging Study
ANY of the following: • Age 45-75* years and ONE of the following: ◦ PSA >3ng/ml ◦ Very suspicious DRE *For individuals with any of the following risk factors, screening may begin at age 40: • Black/African American ancestry • Germline mutations that increase the risk of prostate cancer • Family history of first- or second-degree relative with prostate, male breast, pancreatic, or ovarian cancer • Family history of two or more first-degree relatives diagnosed at any age with colorectal, endometrial, breast, or prostate cancer • Family history of first- or second-degree relative diagnosed at age ≤45 years with female breast cancer • Family history of first- or second-degree relative diagnosed at age ≤50 years with colorectal or endometrial cancer • Age >75 years and ONE of the following: ◦ PSA ≥4ng/ml ◦ Very suspicious DRE • At least one negative/non-diagnostic TRUS biopsy and ANY of the following: ◦ Rising PSA ◦ Abnormal DRE ◦ Need for confirmatory MR/US fusion biopsy	ANY of the following: • Transrectal ultrasound (CPT® 76872) • TRUS-guided biopsy (CPT® 76942) • MRI/US fusion biopsy (CPT® 76942) • MRI Pelvis without and with contrast (CPT® 72197) or without contrast (CPT® 72195)
• PIRADS 3, 4, or 5 lesion identified on recent diagnostic MRI Pelvis (CPT® 72195 or CPT® 72197) and planning for biopsy to be done by MRI/TRUS fusion technique	• 3D Rendering (CPT® 76376 or CPT® 76377)

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Indication	Medically Necessary Imaging Study
ANY of the following: • Multifocal (2 or more lesions) high-grade prostatic intraepithelial neoplasia (PIN) • Atypia on biopsy	• Extended pattern re-biopsy within 6 months by TRUS-guided biopsy (CPT® 76942)
• Solitary PIN (1 lesion)	ONE of the following, to be repeated in one year: • MRI Pelvis without contrast (CPT® 72195) • MRI Pelvis without and with contrast (CPT® 72197) • MRI/US fusion biopsy (CPT® 76942 or 76872) ◦ These codes are medically necessary in addition to MR Pelvis codes above, if requested
In office, transperineal, MRI guided biopsy without US fusion (i.e., ProMaxo)	Neither MRI CPT® 77021 nor 76498 are medically necessary in conjunction with procedure codes. MRI is bundled in with the procedure code.
An existing MRI cannot be used for MRI/US fusion biopsy	Unlisted MRI code (CPT® 76498)

Background and Supporting Information

Prostate cancer is commonly detected through early evaluation strategies incorporating prostate-specific antigen (PSA) testing and digital rectal examination (DRE). PSA is a serum biomarker produced by prostate epithelial cells, and although not cancer-specific, increasing PSA levels correlate with higher likelihood of malignancy. Clinical suspicion is heightened by abnormal DRE findings, rising PSA trends, or persistently elevated PSA following prior negative biopsy (NCCN, 2026).

Risk stratification for suspected prostate cancer incorporates patient age, PSA level, DRE findings, and clinical risk factors, including family history and germline mutations. Individuals with elevated PSA or abnormal DRE require further diagnostic evaluation to

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identify clinically significant disease while minimizing unnecessary procedures (NCCN, 2026).

Evidence Discussion

Clinical evaluation of suspected prostate cancer is supported by evidence demonstrating that PSA levels and DRE findings are associated with the likelihood of clinically significant malignancy. Increasing PSA levels correlate with a higher probability of prostate cancer, and abnormal DRE findings may identify tumors independent of PSA level. However, PSA lacks specificity, as elevations may occur in benign conditions, which can lead to unnecessary biopsies and patient anxiety (NCCN, 2026).

Imaging with multiparametric MRI is supported as an important adjunct in the diagnostic pathway. MRI improves detection and localization of clinically significant tumors and enhances patient selection for biopsy. Evidence demonstrates that MRI-targeted biopsy techniques increase detection of higher-grade disease while reducing identification of low-risk disease, thereby improving diagnostic accuracy and limiting overdiagnosis (NCCN, 2026).

Transrectal ultrasound-guided biopsy and MRI/ultrasound fusion biopsy are supported for tissue diagnosis in individuals with suspected prostate cancer. Targeted biopsy approaches improve sampling of suspicious lesions and are particularly beneficial in patients with prior negative biopsy and persistent clinical concern. These approaches increase detection of clinically significant cancer while reducing the number of unnecessary repeat biopsies (NCCN, 2026).

Repeat imaging and biopsy strategies in individuals with atypia, high-grade prostatic intraepithelial neoplasia, or persistently abnormal clinical findings are supported by evidence showing an increased risk of subsequent cancer detection in these populations. Structured follow-up with MRI and/or repeat biopsy allows for timely identification of clinically significant disease, though repeated procedures carry risks including infection, bleeding, and patient burden. Overall, the use of risk-based imaging and biopsy strategies balances improved cancer detection with minimization of unnecessary interventions (NCCN, 2026).

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Prostate Cancer – Initial Work-up/ Staging (ONC-19.2)

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Criteria

Indication	Medically Necessary Imaging Study
Localized prostate cancer with any of the following risk groups (see: **ONC-19.0** for definition of risk groups): • Low risk • Favorable intermediate risk	Advanced imaging is not routinely considered medically necessary for initial staging. If not already performed prior to biopsy, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for any of the following: • Prior to planned treatment (surgery and/or radiation therapy) • To establish candidacy for active surveillance

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Indication	Medically Necessary Imaging Study
Localized prostate cancer with any of the following risk groups (see: **ONC-19.0** for definition of risk groups): • Unfavorable intermediate risk • High-risk • Very high-risk	Any ONE of the following combinations, not all (may be obtained in addition to mpMRI prostate): • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) • CT Chest with contrast (CPT® 71260), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197) if not previously performed, and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • PSMA PET/CT scan (CPT® 78815 or CPT® 78816) or PSMA PET/MRI (CPT® 78813 and CPT® 76498) using any one of the following radiotracers: ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{68}Ga Gozetotide (Illuccix®,Locametz®, and Gozellix®) ◦ ^{18}F Flotufolastat (Posluma®) *If initial CT or MRI of chest/abdomen/pelvis and bone scan is negative or inconclusive but there remains a significant clinical suspicion for metastatic disease (i.e., continued increase in PSA or symptoms of bony metastatic disease), PSMA PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) is considered medically necessary.

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Indication	Medically Necessary Imaging Study
To confirm oligo- or low volume metastatic prostate cancer suspected on conventional imaging in individuals with biopsy-proven prostate cancer	• PSMA PET/CT (CPT® 78815 or CPT® 78816) or PSMA PET/MRI (CPT® 78813 and CPT® 76498) with any of the following radiotracers: ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{18}F Flotufolastat (Posluma®) ◦ ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®)
Known diffuse metastatic prostate cancer (including prior to prostate biopsy) (In obvious diffuse metastatic prostate cancer based on other imaging, PSMA PET is not medically necessary)	Any ONE of the following combinations, not all: • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) • CT Chest with contrast (CPT® 71260), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197) if not previously performed, and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)

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Indication	Medically Necessary Imaging Study
Inconclusive bone scan in individuals with prostate cancer	Any ONE of the following: • CT with contrast of involved body site • MRI without and with contrast of involved body site • PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) using any one of the following radiotracers: ◦ ^{18}F Fluciclovine ◦ ^{11}C Choline ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{18}F Flotufolastat (Posluma®) ◦ ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) ◦ ^{18}F sodium fluoride
If pathology or clinical scenario suggests neuroendocrine-predominant prostate cancer	See: **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)**

At present, neither the AUA guidelines nor NCCN guidelines consider cribriform histology and/or perineural invasion as standalone risk factors that move individuals into an unfavorable intermediate risk or higher group.

Background and Supporting Information

Prostate cancer is stratified into risk groups based on clinical stage, prostate-specific antigen (PSA), and histologic grade (Gleason Grade Group), which together guide staging evaluation and treatment planning. These risk groups range from low risk to very high risk and reflect the probability of local advancement, nodal involvement, and distant metastases (NCCN, 2026).

In clinically localized disease, the likelihood of metastatic spread varies significantly by risk category. Low-risk and favorable intermediate-risk disease are associated with a very low probability of metastatic involvement, while unfavorable intermediate-, high-, and very high-risk disease demonstrate increased risk of regional and distant metastases, including bone and visceral sites (NCCN, 2026).

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Evidence Discussion

Risk stratification using PSA, clinical stage, and Gleason Grade Group is supported as the foundation for determining appropriate imaging in newly diagnosed prostate cancer. Evidence demonstrates that individuals with low-risk or favorable intermediate-risk disease have a very low likelihood of metastatic disease, and routine advanced imaging in these populations offers limited diagnostic yield. As a result, omitting advanced imaging in these groups reduces unnecessary radiation exposure, cost, and false-positive findings without compromising clinical outcomes (NCCN, 2026).

Multiparametric MRI is supported for local staging and treatment planning, particularly prior to definitive therapy or when considering active surveillance. MRI provides superior soft tissue characterization compared with CT and improves identification of extracapsular extension and other adverse local features. This improves risk stratification and helps guide clinical decision-making, though it may be limited by availability, cost, and variability in interpretation (NCCN, 2026).

In individuals with unfavorable intermediate-, high-, or very high-risk disease, cross-sectional imaging and bone imaging are supported due to the increased likelihood of metastatic spread. CT of the chest, abdomen, and pelvis and bone scans allow detection of nodal and skeletal metastases, which are critical for staging and treatment selection. The use of these modalities improves staging accuracy and helps direct appropriate systemic or locoregional therapy, although they are associated with radiation exposure and potential contrast-related risks (NCCN, 2026).

PSMA PET imaging is supported as an alternative or adjunct to conventional imaging due to its higher sensitivity for detecting metastatic and small-volume disease. Evidence indicates that PSMA PET can identify lesions not detected on conventional imaging and may clarify equivocal findings. However, it is not routinely required in all patients, as its impact on long-term survival outcomes remains uncertain and false-positive findings may occur, necessitating cautious interpretation and potential confirmatory testing (NCCN, 2026).

Additional imaging is supported in cases of inconclusive findings or when clinical suspicion for metastatic disease persists despite negative conventional imaging. Modalities such as CT, MRI, or advanced PET tracers may further characterize suspicious lesions and guide management decisions. This stepwise, risk-adapted imaging approach balances improved diagnostic accuracy with minimization of unnecessary imaging and associated harms (NCCN, 2026).

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Prostate Cancer – Restaging/Recurrence (ONC-19.3)

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Criteria

Indication	Medically Necessary Imaging Study
For ANY of the following in individuals with prostate cancer: • Obvious progression by DRE with plans for prostatectomy or radiation therapy • Repeat TRUS biopsy for rising PSA shows progression to a higher Gleason's score with plans for prostatectomy or radiation therapy • Inconclusive findings on CT scan	• MRI Pelvis without and with contrast (CPT® 72197)
Non-metastatic prostate cancer previously treated with ablation, hormonal therapy, or chemotherapy **and** any one of the following: • Clinical suspicion of relapse/recurrence • Palpable anastomotic recurrence • PSA rises above post-treatment baseline to >0.2ng/mL on two consecutive measurements	Any ONE of the following combinations (may be obtained in addition to mpMRI Prostate): • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • CT Chest with contrast (CPT® 71260), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)

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Indication	Medically Necessary Imaging Study
Non-metastatic prostate cancer previously treated with prostatectomy and **all** of the following are met: • Persistent detectable PSA after prostatectomy, or • Undetectable PSA that subsequently becomes detectable with two consecutive increases in PSA (to any amount), or • Any increase in PSA to 0.1 ng/mL or higher	Any ONE of the following: • PSMA PET/CT scan (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) with any of the following radiotracers: ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{18}F Flotufolastat (Posluma®) ◦ ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • CT Chest with contrast (CPT® 71260), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)

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Indication	Medically Necessary Imaging Study
Non-metastatic prostate cancer previously treated with radiation therapy and two consecutive increases in PSA above nadir	Any ONE of the following: • PSMA PET/CT scan (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) with any of the following radiotracers: ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{18}F Flotufolastat (Posluma®) ◦ ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • CT Chest with contrast (CPT® 71260), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)
Non-metastatic prostate cancer previously treated with prostatectomy or radiation therapy, and **all** of the following are met: • PSA rises on two consecutive measurements above post-treatment baseline **and** • PSA ≥1 ng/mL **and** • Recent CT scan and bone scan are negative for metastatic disease	• PET/CT scan (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) using any **ONE** of the following radiotracers: ◦ ^{18}F-Fluciclovine ◦ ^{11}C Choline

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Indication	Medically Necessary Imaging Study
Suspected progression of known metastatic prostate cancer based on: • New or worsening signs/symptoms • Rising PSA levels	• CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • CT with contrast of any involved or symptomatic body part
Metastatic prostate cancer receiving treatment with chemotherapy or Pluvicto®	One of the following combinations, every 2 cycles (6 to 8 weeks), while on chemotherapy: • CT Abdomen and Pelvis with contrast (CPT® 74177) and CT scan with contrast of any involved body part • CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) OR • CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197) AND, every 3-6 months: • Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) If any of the above conventional imaging studies are inconclusive: • PSMA PET/CT scan (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) and/or • SPECT/CT (CPT® 78830 or 78832)

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Indication	Medically Necessary Imaging Study
Metastatic prostate cancer receiving anti-androgen therapy	One of the following combinations, every 3 months, while on anti-androgen therapy: • CT Abdomen and Pelvis with contrast (CPT® 74177) and CT scan of any involved body part • CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) OR • CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197) AND, every 3-6 months: • Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)

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Indication	Medically Necessary Imaging Study
Active metastatic prostate cancer with evidence of progression (clinical/ PSA/conventional imaging) and being considered for ^{177}Lu-PSMA-617 (Pluvicto®) treatment	ANY or ALL of the following: • PSMA PET/CT scan (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) with one of the following agents: ◦ ^{68}Ga PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{68}Ga Gozetotide (Illucix®, Locametz®, and Gozellix®) ◦ ^{18}F Flotufolastat (Posluma®) • The combination of: ◦ CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) **OR** ◦ CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) *While PSMA PET is considered medically necessary to determine candidacy for Pluvicto®, it is not considered medically necessary for restaging on Pluvicto®; thus, baseline conventional imaging is considered medically necessary in addition to baseline PSMA PET/CT or PET/MRI.

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Indication	Medically Necessary Imaging Study
Non-metastatic prostate cancer treated with prostatectomy or radiation therapy who do not meet ALL above criteria for PSMA PET/CT but have clinical signs/ symptoms of recurrence	Any ONE of the following combinations: • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • CT Chest with contrast (CPT® 71260), CT Abdomen with contrast (CPT® 74160), MRI Pelvis without and with contrast (CPT® 72197), and Bone scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes)
Prior to start of Xofigo® (Radium-223) therapy in individuals with prostate cancer	• ONE time CT Chest, Abdomen, and Pelvis with contrast (CPT® 71260 and CPT® 74177)
Inconclusive bone scan or negative bone scan with inconclusive CT or MRI in individuals with prostate cancer	Any ONE of the following: • CT with contrast of involved body site • MRI without and with contrast of involved body site • PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) using any one of the following radiotracers: ◦ ^{18}F Fluciclovine ◦ ^{11}C Choline ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{18}F Flotufolastat (Posluma®) ◦ ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) ◦ ^{18}F sodium fluoride

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Indication	Medically Necessary Imaging Study
Conventional imaging studies (CT and bone scan) suggests oligo- or low volume metastatic disease that needs further confirmation in individuals with prostate cancer	• PET/CT scan (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) using any one of the following radiotracers: ◦ ^{18}F Fluciclovine ◦ ^{11}C Choline ◦ ^{68}Ga-PSMA-11 ◦ ^{18}F Piflufolastat (Pylarify®) ◦ ^{68}Ga Gozetotide (Illuccix®, Locametz®, and Gozellix®) ◦ ^{18}F Flotufolastat (Posluma®)
If pathology or clinical scenario suggests neuroendocrine-predominant disease	See: **Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)**

Background and Supporting Information

Prostate cancer recurrence and progression are most commonly identified through rising prostate-specific antigen (PSA) levels, abnormal digital rectal examination (DRE), or imaging findings following definitive therapy. PSA kinetics, including persistence after prostatectomy or rising levels after radiation therapy, serve as sensitive indicators of biochemical recurrence and guide further diagnostic evaluation (NCCN, 2026).

Patterns of recurrence may include local recurrence within the prostate bed or pelvis, regional lymph node involvement, or distant metastatic disease, most frequently involving bone and visceral organs. Imaging strategies are tailored based on the likelihood of recurrence, disease burden, and prior treatment modality (NCCN, 2026).

Evidence Discussion

The use of PSA levels and clinical findings such as DRE abnormalities is supported as a primary trigger for restaging imaging in suspected recurrent prostate cancer. Evidence demonstrates that rising PSA after definitive therapy, including PSA persistence or biochemical recurrence, is strongly associated with disease recurrence and warrants further imaging evaluation to localize disease and guide treatment planning (NCCN, 2026).

Conventional imaging with CT of the chest, abdomen, and pelvis and bone scan remains the standard approach for evaluating recurrent or progressive prostate cancer, particularly in patients with higher PSA levels or symptoms suggestive of metastatic involvement. CT provides detailed anatomic assessment of nodal and visceral disease,

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while bone scan is effective for detecting skeletal metastases, the most common site of spread. These modalities are widely available and provide a comprehensive overview of disease burden, although sensitivity may be limited for small-volume or early metastatic disease (NCCN, 2026).

PSMA PET imaging is supported for evaluation of biochemical recurrence due to its improved sensitivity and specificity compared with conventional imaging. Evidence indicates that PSMA-targeted radiotracers can detect micrometastatic disease at lower PSA levels and may be used without prerequisite conventional imaging in certain post-prostatectomy settings. This improved detection can influence treatment planning, including the identification of candidates for localized or systemic therapy. However, limitations include potential false-positive findings and limited evidence regarding impact on long-term survival outcomes. PSMA PET/CT and/or SPECT/CT is not supported in the absence of equivocal conventional imaging. While there is emerging data regarding use of SPECT/CT for restaging on therapy with Pluvicto®, neither the NCCN nor AUA nor SNMMI provide guidance for its use in routine restaging in this setting (NCCN, 2026).

In individuals with metastatic disease or suspected progression based on symptoms or rising PSA, serial imaging is supported to assess treatment response and disease progression. Conventional imaging remains the standard for monitoring during systemic therapy, with CT and bone scan performed at defined intervals. Advanced imaging modalities are generally reserved for equivocal findings or specific clinical scenarios, balancing improved diagnostic accuracy with the risks of increased cost, radiation exposure, and uncertain impact on outcomes (NCCN, 2026).

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Prostate Cancer – Follow-up On Active Surveillance (ONC-19.4)

ON.PR.0019.4.A
v1.0.2027

Criteria

Current active surveillance guidelines suggest the following protocol:

- PSA every 6 months
- Digital Rectal Exam (DRE) every 12 months
- Repeat prostate biopsy every 12 months
- Repeat mpMRI (CPT® 72195 or CPT® 72197) no more often than every 12 months

Indication	Medically Necessary Imaging Study
Routine monitoring in individuals with prostate cancer on active surveillance protocol	• MRI Pelvis without (CPT® 72195) or without and with contrast (CPT® 72197) at initiation of active surveillance, and every 12 months thereafter
Planning for re-biopsy to be done by MRI/US fusion technique in individuals with prostate cancer	• 3D Rendering (CPT® 76376 or CPT® 76377)
For ANY of the following in individuals with prostate cancer: • Progression is suspected based on DRE changes or rising PSA and a recent TRUS biopsy was negative • Repeat TRUS biopsy shows progression to a higher Gleason score	• MRI Pelvis without (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197)
Individuals with prostate cancer on active surveillance who are noted to have progression and have plans to initiate treatment	• Imaging studies for initial staging as per **ONC-19.2**

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Background and Supporting Information

Active surveillance is a management strategy for individuals with low-risk prostate cancer that involves regimented monitoring for disease progression without specific anticancer treatment. It is designed to defer or avoid treatment-related morbidity while maintaining the opportunity for curative intervention if disease progression occurs. This approach is appropriate for carefully selected individuals with favorable disease characteristics and sufficient life expectancy (NCCN, 2026).

Active surveillance is distinct from observation (watchful waiting), which is generally reserved for individuals with limited life expectancy. Watchful waiting involves cessation of routine monitoring, and treatment is initiated only if symptoms develop. In contrast, active surveillance includes scheduled follow-up to detect disease progression at a stage when curative treatment remains feasible (NCCN, 2026).

Evidence Discussion

Active surveillance protocols are supported by evidence demonstrating that many individuals with low-risk prostate cancer have indolent disease that may not require immediate treatment. Close monitoring with PSA, DRE, biopsy, and imaging allows identification of disease progression while avoiding unnecessary interventions and associated morbidity. This strategy reduces overtreatment and preserves quality of life without compromising oncologic outcomes in appropriately selected individuals (NCCN, 2026).

Multiparametric MRI is supported as part of routine monitoring due to its ability to improve detection of clinically significant disease and guide targeted biopsy. MRI enhances visualization of tumor location and extent, increasing the likelihood of identifying progression that may warrant a change in management. However, MRI should be used at appropriate intervals to limit cost, resource utilization, and potential overdiagnosis of indolent findings (NCCN, 2026).

Routine metastatic staging imaging is not supported during active surveillance in the absence of clinical progression, as the probability of metastatic disease in low-risk populations is very low. Avoiding unnecessary imaging reduces radiation exposure, false-positive findings, and downstream interventions without adversely impacting outcomes (NCCN, 2026).

When progression is suspected based on rising PSA, abnormal DRE, or biopsy upgrading, imaging plays a role in reassessment and treatment planning. At this point, imaging follows principles used in initial staging to accurately characterize disease extent and guide definitive management. This stepwise escalation in imaging intensity balances early detection of clinically meaningful progression with minimization of unnecessary diagnostic procedures (NCCN, 2026).

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Surveillance/Follow-up For Treated Prostate Cancer (ONC-19.5)

ON.PR.0019.5.A
v1.0.2027

Criteria

Indication	Medically Necessary Imaging Study
ANY of the following in individuals with prostate cancer: • Asymptomatic or stable chronic symptoms • Stable DRE findings • Stable PSA levels	• Advanced imaging is not routinely considered medically necessary for surveillance

Background and Supporting Information

Following definitive treatment of prostate cancer, ongoing surveillance focuses on monitoring for recurrence or progression using prostate-specific antigen (PSA), digital rectal examination (DRE), and clinical assessment. PSA is a highly sensitive marker for detecting biochemical recurrence, and trends over time guide further diagnostic evaluation and management (NCCN, 2026).

Surveillance strategies are tailored based on initial risk group, treatment modality, and patient-specific factors. In individuals with stable PSA values, normal or unchanged DRE findings, and absence of symptoms, the likelihood of clinically significant recurrence is low. Therefore, routine follow-up emphasizes clinical and laboratory monitoring rather than imaging (NCCN, 2026).

Evidence Discussion

In individuals with treated prostate cancer who are asymptomatic and demonstrate stable PSA levels and DRE findings, evidence supports that advanced imaging is not routinely necessary. PSA is highly sensitive for identifying recurrence, and stable PSA trends are associated with a low likelihood of clinically significant disease, making routine imaging of limited value in this population (NCCN, 2026).

Avoiding routine advanced imaging in this context reduces potential harms, including unnecessary radiation exposure, contrast-related risks, false-positive findings, and

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downstream invasive procedures. These risks are particularly relevant given the low pretest probability of recurrence in individuals with stable clinical and laboratory findings (NCCN, 2026).

Clinical observation using PSA monitoring and DRE allows timely identification of changes that may warrant further evaluation. Evidence demonstrates that rising PSA or new clinical findings are reliable indicators for recurrence, at which point imaging can be appropriately escalated to localize disease and guide treatment decisions (NCCN, 2026).

Overall, a surveillance strategy that relies on clinical and biochemical monitoring with selective use of imaging provides an optimal balance between early detection of recurrence and minimization of unnecessary testing. This approach aligns with guideline recommendations to avoid overuse of imaging in low-risk clinical scenarios while maintaining the ability to intervene promptly when progression is suspected (NCCN, 2026).

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Testicular, Ovarian, and Extragonadal Germ Cell Tumors (ONC-20)

Guideline

Testicular, Ovarian, and Extragonadal Germ Cell Tumors – General Considerations (ONC-20.0)
Testicular, Ovarian, and Extragonadal Germ Cell Tumors – Initial Work-Up/Staging (ONC-20.1)
Testicular, Ovarian, and Extragonadal Germ Cell Tumors – Restaging/Recurrence (ONC-20.2)
Testicular, Ovarian and Extragonadal Germ Cell Tumors – Surveillance (ONC-20.3)
References (ONC-20)

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Testicular, Ovarian, and Extragonadal Germ Cell Tumors – General Considerations (ONC-20.0)

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Criteria

- This section applies to primary germ cell tumors occurring outside the central nervous system for individuals older than the age of 15 years at the time of initial diagnosis. Individuals 15 years of age or younger at diagnosis should be imaged according to pediatric guidelines in: **Pediatric Germ Cell Tumors (PEDONC-10)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- These guidelines are for germ cell tumors of the testicle, ovary and extragonadal sites as well as malignant sex cord stromal tumors.
- Requests for imaging must state the histologic type of the cancer being evaluated.
- Classified as seminoma/dysgerminoma, non-seminomatous germ cell tumors (NSGCT), or mixed.
  - Dysgerminoma is the ovarian equivalent of seminoma. There is no testicular dysgerminoma.
  - Mixed tumors are treated as NSGCTs, as they tend to be more aggressive.
  - Germ Cell Tumors include:
    - Teratomas
    - Yolk sac tumors
    - Choriocarcinomas
    - Embryonal carcinomas
    - Mixed germ cell tumors
    - Dysgerminoma
  - Sex Cord Stromal Tumors include:
    - Granulosa Cell Tumor (juvenile/adult)
    - Fibroma/Fibrosarcoma
    - Thecoma
    - Levdig Cell Tumor
    - Sertoli Cell Tumor
    - Mixed (Sertoli-Levdig, Gynadroblastoma)

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- MRI in place of CT scans to reduce risk of secondary malignancy is not supported by the peer-reviewed literature. CT scans are considered medically necessary for surveillance and are the preferred modality of imaging to assess for recurrence.
- PET/CT is considered not medically necessary for evaluation of non-seminomatous germ cell tumors.

Background and Supporting Infomraiton

Germ cell tumors (GCTs) arise from primordial germ cells and may occur in the gonads (testes and ovaries) or at extragonadal sites such as the mediastinum or retroperitoneum. These tumors include a spectrum of histologies, broadly categorized into seminomatous tumors (seminoma in males and dysgerminoma in females) and non-seminomatous germ cell tumors (NSGCTs), which include embryonal carcinoma, yolk sac tumor, choriocarcinoma, teratoma, and mixed histologies (NCCN, 2025; NCCN, 2026).

Classification of germ cell tumors into seminoma/dysgerminoma and non-seminomatous subtypes is supported by evidence demonstrating distinct biologic behavior, treatment response, and prognosis. Seminomatous tumors are generally more radiosensitive and have a more predictable pattern of spread, while NSGCTs are more aggressive and heterogeneous, requiring different imaging and treatment approaches. This distinction supports histology-driven imaging and management strategies to optimize outcomes (NCCN, 2025).

Malignant germ cell tumors of the ovary and testis, as well as extragonadal germ cell tumors, are highly curable, particularly when diagnosed at an early stage. Management strategies include surgery, systemic therapy, and surveillance depending on histology, stage, and risk factors. Imaging plays a central role in staging, treatment planning, and follow-up, with cross-sectional imaging used to evaluate disease extent and monitor response (NCCN, 2025; NCCN, 2026).

Evidence Discussion

Cross-sectional imaging with CT or MRI is supported as a central component of staging and follow-up due to its ability to evaluate the retroperitoneum, pelvis, and thorax, which are common sites of metastatic spread. CT is widely utilized because of its accessibility and ability to detect nodal and visceral disease, and it remains the preferred modality for surveillance despite concerns regarding cumulative radiation exposure. MRI may be used as an alternative in selected cases but has not demonstrated clear superiority for routine surveillance (NCCN, 2025).

PET/CT imaging has a limited role and is not routinely recommended in non-seminomatous germ cell tumors due to lack of added diagnostic value over conventional imaging. Evidence indicates that PET/CT may not reliably differentiate viable tumor from necrosis or fibrosis in NSGCT, which can result in false-positive or false-negative

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findings. Therefore, it is reserved for select clinical scenarios, supporting a more targeted and judicious use of advanced imaging modalities (NCCN, 2025).

Health Equity Considerations

Testicular, ovarian, and extragonadal germ cell tumors (GCTs) predominantly affect adolescents and young adults and are among the most curable solid malignancies; however, important inequities persist across socioeconomic, racial/ethnic, and health system factors. Population-based data demonstrate marked racial and ethnic differences in GCT incidence, stage at diagnosis, and survival, with rapidly rising incidence and disproportionately higher rates of advanced-stage disease among Hispanic, American Indian/Alaska Native, and non-Hispanic Black populations compared with non-Hispanic White patients (Almeida et al., 2025; Ghazarian & McGlynn, 2020). Socioeconomic hardship, insurance gaps, and geographic distance from specialty cancer centers are strongly associated with delayed diagnosis, later stage at presentation, treatment delays, and worse progression-free and overall survival, even after controlling for race and tumor characteristics (Karakus et al., 2026). These disparities are particularly consequential in GCTs, where early diagnosis can often obviate the need for intensive multimodality therapy and reduce long-term treatment-related morbidity.

Health equity considerations are further compounded in ovarian and extragonadal GCTs, which are rarer, less well studied, and more likely to be managed outside high-volume specialty centers. Compared with testicular GCTs, ovarian GCTs have lower survival and greater variability in care, reflecting limited evidence, lack of standardized risk stratification, and reduced access to subspecialty expertise—factors that disproportionately affect patients from underserved communities (Sköld et al., 2024). Extragonadal GCTs, including mediastinal and retroperitoneal primaries, also require complex multidisciplinary management that may be less accessible to patients with socioeconomic or geographic barriers. Imaging guidelines should therefore be applied with awareness of structural barriers to timely evaluation and surveillance, and efforts to standardize imaging pathways, reduce unnecessary delays, and facilitate referral to experienced centers are critical to mitigating inequities and improving outcomes across all GCT populations (Karakus et al., 2026; Sköld et al., 2024).

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Testicular, Ovarian, and Extragonadal Germ Cell Tumors – Initial Work-Up/ Staging (ONC-20.1)

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Criteria

Indication	Medically Necessary Imaging Study
Suspicious testicular mass or ovarian mass with concern for metastatic disease on ultrasound • For all other ovarian masses prior to tissue diagnosis, see **Complex Adrenal Masses (PV-5.3)**	EITHER of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
After orchiectomy or oophorectomy in individuals with testicular, ovarian, and extragonadal germ cell tumors: • Orchiectomy/oophorectomy is both diagnostic and therapeutic, and imaging was not performed prior to surgery OR • Individual is Stage IS (i.e., has persistently elevated tumor markers)	EITHER of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Prior to initiation of chemotherapy to confirm staging, if prior imaging was performed ≥4 weeks ago in individuals with testicular, ovarian, and extragonadal germ cell tumors	Repeat abdominal imaging with ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

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Indication	Medically Necessary Imaging Study
For ANY of the following in individuals with testicular, ovarian, and extragonadal germ cell tumors: • Testicular non-seminoma histology • Any ovarian germ cell tumor • Abdominal lymphadenopathy noted on CT scan • Abnormal chest x-ray or signs/ symptoms suggestive of chest involvement • Individual is Stage IS (i.e., has persistently elevated tumor markers)	In addition to the above abdominal/pelvic imaging: • CT Chest with contrast (CPT® 71260)
Individual is Stage IS (i.e., has persistently elevated tumor markers) in individuals with testicular, ovarian, and extragonadal germ cell tumors	In addition to the above, scrotal ultrasound (CPT® 76856 or CPT® 76857) to assess for a contralateral testis mass if one has not been conducted in the last 3 months
Prior surgery with incomplete staging for ovarian germ cell tumors	EITHER of the following: • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Inconclusive conventional imaging for ovarian germ cell tumors	PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498)
Extragonadal Germ Cell Tumor	CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177)
Sex Cord Stromal Tumors	Once diagnosis confirmed, no imaging is considered medically necessary.

Background and Supporting Information

Germ cell tumors (GCTs) of the testis, ovary, and extragonadal sites are generally diagnosed through a combination of clinical examination, tumor markers, and imaging.

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Following diagnosis or strong suspicion of malignancy, an orchiectomy or oophorectomy is typically performed, which serves both diagnostic and therapeutic purposes. Postoperative tumor marker assessment, including AFP, β-hCG, and LDH, is essential for staging and risk stratification. Persistently elevated tumor markers after surgery define Stage IS disease and indicate likely residual or metastatic disease (NCCN, 2025; Stephenson et al., 2019).

Evidence Discussion

The recommended imaging strategy for initial work-up and staging of germ cell tumors is supported by evidence demonstrating that ultrasound is highly effective for initial evaluation of testicular masses. Ultrasound provides excellent spatial resolution, avoids radiation exposure, and is widely available, making it the preferred first-line modality. MRI does not improve diagnostic accuracy in this setting and may increase cost and delays, supporting its exclusion from routine initial evaluation (Stephenson et al., 2019).

Cross-sectional imaging with CT or MRI of the abdomen and pelvis is supported as the cornerstone for staging due to the high prevalence of retroperitoneal lymph node metastases. CT provides rapid image acquisition and excellent anatomic detail, which is critical in detecting nodal and visceral disease. MRI offers comparable diagnostic performance without ionizing radiation but is more susceptible to motion artifact and less widely available. These complementary strengths justify allowing either modality depending on clinical context while maintaining CT as the primary standard (Stephenson et al., 2019; NCCN, 2025).

Chest imaging is supported in individuals with higher-risk disease features, including non-seminomatous histology, abnormal abdominal imaging, or clinical suspicion of thoracic involvement. CT of the chest has higher sensitivity than chest radiography for detecting pulmonary metastases, particularly in non-seminomatous germ cell tumors, where skip metastases are more common. However, selective use of chest CT balances improved detection with concerns regarding radiation exposure (Stephenson et al., 2019).

The limited role of PET/CT in initial staging is supported by evidence demonstrating no significant improvement in clinical outcomes compared with conventional imaging. In non-seminomatous germ cell tumors, PET imaging has not shown sufficient accuracy in distinguishing viable tumor from necrosis and may lead to false-positive findings. Additionally, PET exposes patients to additional radiation and cost without clear benefit, supporting its restriction to select clinical scenarios (Stephenson et al., 2019).

Finally, repeat imaging prior to initiation of systemic therapy is supported by evidence indicating that germ cell tumors can have rapid growth kinetics. Updated imaging ensures accurate staging and appropriate treatment selection, reducing the risk of undertreatment or overtreatment based on outdated imaging findings (Stephenson et al., 2019).

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Testicular, Ovarian, and Extragonadal Germ Cell Tumors – Restaging/ Recurrence (ONC-20.2)

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Criteria

Indication	Medically Necessary Imaging Study
Treatment response for individuals with testicular, ovarian, and extragonadal germ cell tumors with measurable disease or persistent elevated tumor markers, every 2 cycles	• CT Abdomen and Pelvis with contrast (CPT® 74177) OR • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) AND • CT with contrast of previously involved body areas
For any of the following in individuals with testicular, ovarian, and extragonadal germ cell tumors: • At end of adjuvant therapy ◦ Any stage embryonal tumor ◦ Any stage endodermal sinus tumor (i.e., yolk sac tumor) ◦ Stage II-IV dysgerminoma ◦ Stage I, Grade 2 or 3 immature teratoma ◦ Any grade, Stage II-IV immature teratoma ◦ Any stage non-gestational choriocarcinoma • During adjuvant therapy only for signs and symptoms of disease progression	CT Chest with contrast (CPT® 71260) AND EITHER of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

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Indication	Medically Necessary Imaging Study
Inconclusive conventional imaging in individuals with testicular, ovarian, and extragonadal germ cell tumors	PET/CT (CPT® 78815) or PET/MRI (CPT® 78813 and CPT® 76498)
Seminoma with residual mass >3cm after completion of chemotherapy	• PET/CT (CPT® 78815) ◦ If PET/CT is positive, biopsy or resection should be considered ◦ If biopsy or resection is not performed, PET/CT may be repeated once in 6-12 weeks
Nonseminoma or pure seminoma with partial response or with residual mass and ALL of the following: • Abnormal AFP or beta-hCG levels • Need to evaluate for occult brain metastases	• MRI Brain without and with contrast (CPT® 70553)
Stage IIA pure seminoma or stage IIA nonseminoma with borderline retroperitoneal lymph nodes on preoperative imaging, 4-8 weeks after preoperative imaging	ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
End of therapy evaluation for NSGCT post chemotherapy or post retroperitoneal lymph node dissection (RPLND)	• CT Abdomen and Pelvis with contrast (CPT® 74177)
Recurrence suspected in individuals with testicular, ovarian, and extragonadal germ cell tumors, including increased tumor markers	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • Ultrasound (CPT® 76856 or CPT® 76857) of the remaining gonad if applicable
Unexplained pulmonary symptoms despite a negative chest x-ray, or new findings on chest x-ray in individuals with testicular, ovarian, and extragonadal germ cell tumors	• CT Chest with contrast (CPT® 71260)

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Indication	Medically Necessary Imaging Study
Sex cord stromal tumors with elevated inhibin or signs and symptoms of recurrence	• CT Chest with contrast (CPT® 71260) AND one of the following: ◦ CT Abdomen and Pelvis (CPT® 74177) OR ◦ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197)

Background and Supporting Information

Following treatment of germ cell tumors (GCTs), restaging and evaluation for recurrence rely on a combination of imaging, tumor markers, and clinical assessment. Serum tumor markers, including alpha-fetoprotein (AFP), beta-human chorionic gonadotropin (β-hCG), and lactate dehydrogenase (LDH), remain integral for monitoring response to therapy and detecting recurrence, as changes in marker levels may precede radiographic findings (NCCN, 2025).

Patterns of residual disease and recurrence vary by histology. Seminomas often leave residual masses following chemotherapy that may represent fibrosis, necrosis, or viable tumor, whereas non-seminomatous germ cell tumors (NSGCTs) more frequently contain viable tumor or teratoma in residual masses. These differences influence the selection of imaging modalities and the need for additional diagnostic procedures such as biopsy or resection (NCCN, 2025).

Advanced or recurrent disease may also involve atypical metastatic sites, including the brain or contralateral gonad, particularly in the setting of abnormal tumor markers or high-risk histology. Imaging approaches are therefore tailored to clinical findings, tumor biology, and prior imaging results (NCCN, 2025).

Evidence Discussion

Imaging with CT or MRI during and after therapy is supported by evidence demonstrating that cross-sectional imaging provides accurate assessment of disease burden and treatment response in germ cell tumors. CT imaging offers high-resolution anatomic detail for evaluating retroperitoneal lymph nodes and visceral metastases, while MRI provides comparable diagnostic capability without ionizing radiation. The use of interval imaging during therapy helps identify treatment response or progression, allowing timely modification of therapy while balancing cumulative radiation exposure (NCCN, 2025).

PET/CT is selectively supported in the evaluation of residual masses in seminoma following chemotherapy, particularly for lesions greater than 3cm. Evidence indicates that PET/CT has value in distinguishing viable tumor from necrosis or fibrosis in these

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cases, which can guide decisions regarding biopsy, surgical resection, or observation. However, the potential for false-positive findings necessitates confirmatory evaluation or repeat imaging prior to intervention, supporting a cautious and targeted approach (NCCN, 2025).

In contrast, PET imaging is not routinely recommended for non-seminomatous germ cell tumors due to limited diagnostic accuracy in differentiating viable tumor from post-treatment changes. Instead, CT-based evaluation remains the standard for assessing residual disease in NSGCT. This avoids unnecessary additional radiation exposure and cost associated with PET imaging without a corresponding improvement in clinical outcomes (NCCN, 2025).

Comprehensive imaging for suspected recurrence, including CT of the chest, abdomen, and pelvis, is supported by evidence demonstrating common patterns of metastasis to retroperitoneal lymph nodes and lungs. Imaging of additional sites, such as the brain, is appropriate in the setting of abnormal tumor markers or clinical suspicion, as these findings may indicate advanced or disseminated disease. This risk-adapted imaging approach maximizes diagnostic accuracy while minimizing unnecessary imaging in low-risk scenarios (NCCN, 2025).

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Testicular, Ovarian and Extragonadal Germ Cell Tumors – Surveillance (ONC-20.3)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I seminoma treated with orchiectomy alone (no radiotherapy or chemotherapy, also called active surveillance)	ONE of the following, every 4 months in year 1, then every 6 months for years 2 and 3, and then annually until year 5: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Stage I seminoma treated with radiotherapy and/or chemotherapy	ONE of the following, annually for 3 years: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

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Indication	Medically Necessary Imaging Study
Stage IIA and non-bulky stage IIB seminomas treated with radiotherapy or chemotherapy	ONE of the following, once at 3 months, then once at 9-12 months after completion of therapy, then annually for 2 additional years: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Stage II seminoma treated with primary RPLND and NOT treated with adjuvant chemotherapy	ONE of the following, every 4 months in year 1, every 6 months in year 2, and annually in year 3: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Stage II seminoma treated with primary RPLND AND adjuvant chemotherapy	ONE of the following, at 6 months, 12 months, and 24 months: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

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Indication	Medically Necessary Imaging Study
Bulky stage IIB, IIC, and III seminomas treated with chemotherapy	For individuals with ≤3cm residual mass, ONE of the following every 4 months for 1 year, every 6 months for 1 year, and then annually for 2 additional years: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) For individuals with >3cm residual mass and negative PET scan, ONE of the following at 6 and 12 months after completion of therapy, then annually until year 5: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) For individuals with thoracic disease: • CT Chest with contrast (CPT® 71260) every 2 months for 1 year, then every 3 months for 1 year, then annually until year 5 after completion of therapy

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Indication	Medically Necessary Imaging Study
Stage IA non-seminomatous germ cell tumors treated with orchiectomy alone (without risk factors)	ONE of the following, every 4 months for one year, every 6 months in the second year, and then annually for years 3, 4, and 5: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) • Scrotal ultrasound (CPT® 76856 or CPT® 76857) to assess for a contralateral testis mass if one has not been conducted in the last 3 months
Stage IB non-seminomatous germ cell tumors treated with orchiectomy alone (with risk factors – lymphovascular invasion or invasion into spermatic cord/scrotum)	ONE of the following, every 4 months for years 1 and 2, then every 6 months for year 3, and then once in year 4: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) • Scrotal ultrasound (CPT® 76856 or CPT® 76857) to assess for a contralateral testis mass if one has not been conducted in the last 3 months

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Indication	Medically Necessary Imaging Study
Stage IA/IB non-seminomatous germ cell tumors treated with chemotherapy and/or primary RPLND	ONE of the following, annually for 2 years: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) • Scrotal ultrasound (CPT® 76856 or CPT® 76857) to assess for a contralateral testis mass if one has not been conducted in the last 3 months
Stage II-III non-seminomatous germ cell tumors with complete response to chemotherapy +/- post-chemotherapy RPLND	ONE of the following, every 4 months in year 1, every 6 months in year 2, and then annually in year 3: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) For individuals with known thoracic disease or thoracic symptoms, every 4 months in year 1, every 6 months in year 2, then annually until year 4 after completion of therapy: • CT Chest with contrast (CPT® 71260)

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Indication	Medically Necessary Imaging Study
Stage IIA, IIB, or IIC non-seminomatous germ cell tumors treated with post-primary RPLND AND adjuvant chemotherapy	ONE of the following, once at 3-4 months after completion of RPLND: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Stage IIA or IIB non-seminomatous germ cell tumors treated with post-primary RPLND WITHOUT adjuvant chemotherapy	ONE of the following, once at 4 months after completion of therapy and once in year 2: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) • MRI Abdomen without and with contrast (CPT® 74183) • MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
All ovarian germ cell tumors	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) every 3 months for 2 years, every 6 months for an additional year, and then after year 3, only for signs and symptoms of recurrence
• Sex cord stromal tumors (male and female) • Mature teratoma	• No routine advanced imaging is medically necessary for surveillance. • For symptoms, elevated biomarkers, or suspicious findings on physical exam, see **Testicular, Ovarian and Extragonadal Germ Cell Tumors - Restaging/Recurrence (ONC-20.2)** for suspected recurrence.
Extragonadal germ cell tumors	• CT of the involved region every 3 months for one year and every 6 months for one year

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Background and Supporting Information

Germ cell tumor (GCT) surveillance is essential due to the risk of recurrence following initial treatment, particularly within the first several years. These malignancies most commonly affect younger individuals and are associated with excellent long-term survival, making minimization of long-term harms from follow-up, particularly radiation exposure, an important consideration (NCCN, 2026; NCCN, 2025; Laukka et al., 2020).

Patterns of recurrence differ by histology. Seminomas most commonly recur in the retroperitoneum, whereas non-seminomatous germ cell tumors (NSGCTs) demonstrate more heterogeneous metastatic patterns, including pulmonary, nodal, and visceral disease. Thoracic involvement is particularly relevant in NSGCT and advanced disease, supporting selective chest imaging in surveillance (Meyer & Conces, 2002).

Surveillance protocols are risk-adapted based on stage, histology, and treatment modality. Imaging is typically combined with clinical evaluation and tumor markers to detect recurrence at an early and treatable stage while avoiding unnecessary imaging and associated harms (NCCN, 2026; NCCN, 2025; Rizzo et al., 2021).

Evidence Discussion

Surveillance imaging strategies in germ cell tumors are supported by the predictable patterns of recurrence, particularly in the retroperitoneum and lungs. CT of the abdomen and pelvis is considered the reference standard for detecting retroperitoneal nodal metastases due to its reproducibility and high spatial resolution. However, repeated CT imaging results in cumulative radiation exposure, which is a significant concern in this typically young population with long survival (NCCN, 2026; Laukka et al., 2020; Rizzo et al., 2021).

MRI is supported as an alternative to CT for abdominal and pelvic surveillance due to comparable diagnostic accuracy. Prospective evidence demonstrates that MRI with diffusion-weighted imaging has sensitivity equivalent to CT in detecting retroperitoneal metastases, including small lymph nodes. The primary benefit is elimination of ionizing radiation, although limitations include longer imaging time, susceptibility to motion artifact, and resource availability (Laukka et al., 2020).

Evidence supports a risk-adapted approach to surveillance intensity. In stage I seminoma, recurrence rates are relatively low, and studies indicate that most surveillance imaging does not identify relapse. For example, retrospective data show that fewer than 1% of surveillance CT scans identified recurrence, suggesting that many imaging studies may be unnecessary. These findings support structured imaging intervals and avoidance of excessive imaging to reduce cumulative radiation exposure, cost, and patient burden (Rizzo et al., 2021).

Chest imaging is supported in higher-risk populations and those with thoracic disease or symptoms. CT is more sensitive than chest radiography for detecting pulmonary

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metastases and mediastinal lymphadenopathy, particularly in non-seminomatous tumors, where thoracic involvement may occur in up to 17%–25% of cases. However, isolated thoracic relapse is uncommon in early-stage disease, supporting selective rather than routine use of chest CT to balance improved detection with risks of radiation and false positives (Meyer & Conces, 2002).

Overall, surveillance imaging enables early detection of recurrence and contributes to high cure rates in germ cell tumors. However, its benefits must be balanced against harms, including radiation exposure, false-positive findings, cost, and psychological impact. Evidence supports the use of structured, stage- and risk-specific imaging protocols, favoring CT or MRI of the abdomen and pelvis with selective chest imaging, to optimize clinical outcomes while minimizing unnecessary imaging (NCCN, 2026; NCCN, 2025; Laukka et al., 2020; Rizzo et al., 2021; Meyer & Conces, 2002).

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Ovarian Cancer (ONC-21)

Guideline

Ovarian Cancer – General Considerations (ONC-21.0)
Screening for Ovarian Cancer (ONC-21.1)
Ovarian Cancer – Suspected/Diagnosis (ONC-21.2)
Ovarian Cancer – Initial Work-Up/Staging (ONC-21.3)
Ovarian Cancer – Restaging/Recurrence (ONC-21.4)
Ovarian Cancer – Surveillance (ONC-21.5)
References (ONC-21)

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Ovarian Cancer – General Considerations (ONC-21.0)

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Criteria

- Germ cell tumors and sex cord stromal tumors (granulosa cell tumors), are imaged according to **Testicular, Ovarian and Extragonadal Germ Cell Cancer (ONC-20)**.

Background and Supporting Information

Ovarian cancer encompasses a heterogeneous group of malignancies that arise from the ovary, fallopian tube, or peritoneum. These tumors are most commonly classified as epithelial ovarian cancers, primary peritoneal cancers, or fallopian tube cancers, which are managed similarly due to shared histologic and clinical features. Epithelial ovarian cancers represent the majority of cases and include several distinct histologic subtypes, including high-grade serous, endometrioid, clear cell, mucinous, and low-grade serous carcinomas (NCCN, 2026).

High-grade serous carcinoma is the most common subtype, accounting for approximately 70% of epithelial ovarian cancers, and is typically associated with aggressive clinical behavior and advanced stage at diagnosis. Other subtypes, such as endometrioid and clear cell carcinoma, have distinct molecular and clinical characteristics, while mucinous and low-grade serous carcinomas are less common and may demonstrate different patterns of spread and treatment response (NCCN, 2026).

Borderline tumors, also referred to as tumors of low malignant potential, represent a separate category characterized by atypical epithelial proliferation without stromal invasion. These tumors generally have a favorable prognosis but may recur, and when recurrence occurs, it may demonstrate features more consistent with invasive carcinoma. Primary peritoneal and fallopian tube cancers are closely related to epithelial ovarian cancers and are most often of serous histology, particularly high-grade serous carcinoma (NCCN, 2026).

Health Equity Considerations

Substantial health inequities persist across the ovarian cancer care continuum, including differences in stage at diagnosis, receipt of guideline-concordant treatment, access to genetic testing, and overall survival. Black women consistently experience worse survival compared with White women despite similar incidence rates, a disparity largely attributable to later-stage diagnosis, lower likelihood of receiving guideline-adherent

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care, and structural barriers rather than intrinsic tumor biology (Mei et al., 2023; Brubaker & Merritt, 2025). Socioeconomic status, insurance coverage, and geographic location further compound these inequities, with patients who are uninsured, publicly insured, or living in rural or low-resource areas less likely to be treated by gynecologic oncologists or at high-volume centers associated with improved outcomes (Mei et al., 2023). Importantly, when patients across racial and ethnic groups receive comparable, high-quality care, survival disparities are markedly reduced or eliminated, underscoring the central role of equitable access to evidence-based management (Mei et al., 2023; Brubaker & Merritt, 2025).

Inequities also extend to precision oncology and diagnostic evaluation, which directly intersect with imaging pathways. Black patients and those with non-private insurance are less likely to undergo germline and somatic testing for homologous recombination deficiency and other actionable biomarkers, limiting access to targeted therapies and appropriate surveillance strategies (Mei et al., 2023; Brubaker & Merritt, 2025). At a population level, ovarian cancer mortality has declined over time; however, improvements have been uneven, with persistent racial, regional, and urban–rural differences reflecting broader social determinants of health and variations in healthcare infrastructure and access (Razaq et al., 2025). Imaging guidelines should be applied with awareness of these disparities and support timely, guideline-concordant diagnostic evaluation regardless of race, socioeconomic status, or geography, as equitable implementation of imaging and downstream care remains a critical lever for reducing avoidable differences in ovarian cancer outcomes (Mei et al., 2023; Razaq et al., 2025).

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Screening for Ovarian Cancer (ONC-21.1)

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Criteria

Indication	Medically Necessary Study
Individuals with high-risk factors: • Family history of BRCA 1 or BRCA 2 mutations • Family history of ovarian cancer • Hereditary ovarian cancer syndrome that includes ovarian, breast, and/or endometrial and gastrointestinal cancers [Lynch II syndrome] in multiple members of two to four generations • Low parity • Decreased fertility • Delayed childbearing	• The use of advanced imaging for ovarian cancer screening is considered not medically necessary. • Genetic counseling is recommended for women with an increased-risk family history.
Individuals with known BRCA 1 or BRCA 2 mutation	• Transvaginal ultrasound (CPT® 76830), combined with CA-125 for ovarian cancer screening is considered medically necessary annually starting at age 30, until risk-reducing salpingo-oophorectomy is performed.

Background and Supporting Information

Ovarian cancer screening remains a clinical challenge due to the disease's relatively low prevalence but high mortality. The general population lifetime risk is approximately 1.1%–1.3%, yet ovarian cancer accounts for the majority of deaths among gynecologic malignancies, largely due to late-stage diagnosis (Expert Panel on GYN and OB Imaging, 2025; NCCN, 2026).

Risk factors for ovarian cancer include genetic predisposition (particularly BRCA1 and BRCA2 mutations), family history of ovarian or related cancers, nulliparity, decreased fertility, and delayed childbearing. Among these, hereditary syndromes confer the greatest risk increase. BRCA1 mutation carriers have an estimated lifetime risk of approximately 39%–49%, and BRCA2 mutation carriers have a lifetime risk of

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approximately 10%–21%, significantly higher than the general population (Expert Panel on GYN and OB Imaging, 2025; Kotsopoulos et al., 2018).

Early detection of ovarian cancer significantly improves outcomes, with 5-year survival rates exceeding 70%–90% for stage I–II disease but falling below 30% for advanced stages. However, most ovarian cancers are diagnosed at stage III or IV, which limits the effectiveness of treatment and underscores the importance of early detection strategies (Expert Panel on GYN and OB Imaging, 2025).

Evidence Discussion

The clinical stance that routine imaging is not medically necessary for ovarian cancer screening in average-risk individuals is supported by substantial evidence demonstrating lack of mortality benefit. Large randomized controlled trials evaluating screening with transvaginal ultrasound and CA-125 have consistently shown no significant reduction in ovarian cancer mortality despite increased detection of early-stage disease in some cohorts (Expert Panel on GYN and OB Imaging, 2025).

In addition to limited benefit, screening in average-risk populations is associated with meaningful harms. False-positive results are common and may lead to additional imaging, invasive procedures, and surgical interventions. For example, in the PLCO trial, a significant proportion of individuals with false-positive screening results underwent surgery, with a subset experiencing major complications. These findings support the conclusion that the risk-benefit ratio of imaging-based screening in average-risk populations is unfavorable (Expert Panel on GYN and OB Imaging, 2025).

In contrast, evidence supports consideration of screening in high-risk populations, particularly individuals with BRCA1 or BRCA2 mutations. These individuals have substantially elevated lifetime risk, and screening strategies combining transvaginal ultrasound with CA-125 may improve detection of early-stage disease or result in stage shift. Studies have demonstrated relatively high specificity and positive predictive value with multimodal approaches, such as algorithms incorporating serial CA-125 measurements (e.g., ROCA), although evidence demonstrating a definitive reduction in mortality remains limited (Expert Panel on GYN and OB Imaging, 2025).

Data from high-risk cohorts further support individualized surveillance strategies. Prospective studies show that screening in genetically predisposed individuals can identify cancers at earlier stages and may improve surgical outcomes, particularly when screening is performed consistently. However, due to ongoing uncertainty regarding overall mortality benefit, screening is often considered adjunctive to definitive risk-reducing strategies such as prophylactic salpingo-oophorectomy, which has been shown to significantly reduce ovarian cancer incidence in BRCA mutation carriers (Kotsopoulos et al., 2018)

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Ovarian Cancer – Suspected/Diagnosis (ONC-21.2)

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Criteria

- See: **Complex Adnexal Masses (PV-5.3)** for imaging guidelines for evaluation of suspected ovarian malignancies.
- To differentiate the origin of pelvic masses that are not clearly of ovarian origin, see: **Suspected Adnexal Mass (PV-5.1)**.
- Germ cell tumors and sex cord stromal tumors (granulosa cell tumors), are imaged according to **Testicular, Ovarian and Extragonadal Germ Cell Cancer (ONC-20)**.

Indication	Medically Necessary Imaging
• Pelvic signs or symptoms • Palpable pelvic mass	• Transvaginal (TV) ultrasound imaging (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857)
• Ultrasound shows complex and/or solid adnexal mass suspicious for ovarian malignancy or • Any suspicious signs/symptoms for ovarian malignancy (ascites, abdominal symptoms such as distension or tenderness, elevated CA-125, elevated LFTs, obstructive uropathy)	ANY of the following: • MRI Pelvis without and with contrast (CPT® 72197) ◦ MRI Pelvis without contrast (CPT® 72195) if contrast is contraindicated • CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) are considered medically necessary in lieu of CT for individuals with renal insufficiency or contrast allergy. ◦ CT Abdomen and Pelvis without and with contrast (CT Urogram – CPT® 74178) only for symptoms of obstructive uropathy*

Background and Supporting Information

Evaluation of suspected ovarian malignancy typically begins with assessment of pelvic signs or symptoms and imaging of adnexal structures. The differentiation of benign from malignant adnexal masses is critical in clinical management. Many adnexal lesions

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are benign, and unnecessary surgical intervention should be avoided, while accurate identification of malignant lesions is necessary for timely referral and treatment. Imaging therefore plays a key role in risk stratification prior to surgical or oncologic intervention (Zhang et al., 2023).

Evidence Discussion

The use of transvaginal and pelvic ultrasound as the initial imaging modality for suspected ovarian malignancy is supported by evidence demonstrating its high sensitivity for detection of adnexal lesions and ability to guide risk stratification. Ultrasound is widely available, non-invasive, and provides real-time assessment of lesion morphology. However, variability in interpretation highlights the need for standardized systems such as O-RADS to improve diagnostic consistency and accuracy (Zhang et al., 2023).

Risk stratification systems such as O-RADS are supported by strong evidence demonstrating high sensitivity for malignancy detection. A meta-analysis of 26 studies including over 9,500 patients showed pooled sensitivity of approximately 95% for both O-RADS ultrasound and O-RADS MRI, supporting their use in identifying potentially malignant lesions. This high sensitivity minimizes the risk of missed cancers while allowing stratification of patients for appropriate management (Zhang et al., 2023).

Further imaging with MRI or CT is supported when ultrasound findings are suspicious or indeterminate. MRI offers improved soft-tissue contrast and higher specificity (approximately 90%) compared with ultrasound, making it particularly valuable for characterizing indeterminate lesions and refining preoperative risk assessment. CT, while less specific for lesion characterization, provides important information regarding disease extent, including ascites, lymphadenopathy, and other signs of advanced malignancy (Zhang et al., 2023; NCCN, 2025).

This stepwise imaging approach balances diagnostic accuracy with potential harms. Ultrasound serves as an effective initial screening tool, while additional imaging is reserved for higher-risk or indeterminate cases to avoid unnecessary procedures. This strategy reduces the likelihood of overtreatment of benign lesions while ensuring timely identification and management of malignancy, supporting improved clinical outcomes through appropriate triage and staging (Zhang et al., 2023).

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Ovarian Cancer – Initial Work-Up/Staging (ONC-21.3)

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Criteria

- Germ cell tumors and sex cord stromal tumors (granulosa cell tumors), are imaged according to Testicular, Ovarian and Extragonadal Germ Cell Cancer (ONC-20).

Indication	Medically Necessary Imaging Study
Initial staging of all newly diagnosed ovarian cancer, if imaging has not yet been performed	• CT Abdomen and Pelvis with contrast (CPT® 74177) OR MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for biopsy-proven disease or chest symptoms or abnormal chest x-ray prior to biopsy
ANY of the following in individuals with ovarian cancer: • Primary peritoneal disease with biopsy-proven malignancy consistent with ovarian carcinoma • Elevated tumor markers with negative or inconclusive CT or MRI imaging	ONE of the following: • MRI Abdomen without and with contrast (CPT® 74183) and/or MRI Pelvis without and with contrast (CPT® 72197) if not yet performed OR • PET/CT (CPT® 78815)
If both CT and MRI are inconclusive in individuals with ovarian cancer	• PET/CT (CPT® 78815) OR • PET/MRI (CPT® 78813 and 76498)
If PET/CT is inconclusive in individuals with ovarian cancer	• PET/MRI (CPT® 78813 and 76498)

Background and Supporting Information

Initial work-up and staging of ovarian cancer are essential to define disease extent, guide treatment planning, and determine resectability. Ovarian cancer commonly

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presents with advanced intraperitoneal dissemination, involving the omentum, peritoneal surfaces, and regional lymph nodes. Accurate baseline imaging is therefore necessary to assess both local and distant disease burden (NCCN, 2026).

Evidence Discussion

The use of CT of the abdomen and pelvis with contrast as the primary modality for initial staging is supported by its ability to comprehensively evaluate disease extent in ovarian cancer. Evidence demonstrates that CT provides accurate assessment of peritoneal carcinomatosis, omental disease, and nodal involvement, all of which are critical for staging and surgical planning. Advanced imaging improves identification of metastatic disease and assists in determining operability and treatment approach (NCCN, 2026).

MRI is supported as an appropriate alternative in individuals who cannot undergo contrast-enhanced CT, such as those with renal insufficiency or contrast allergy. MRI provides superior soft tissue resolution and has been shown to have comparable accuracy to CT for staging and assessing peritoneal tumor burden. This allows adequate characterization of disease distribution while avoiding the limitations of non-contrast CT imaging (NCCN, 2026).

Chest imaging with CT is supported in the setting of biopsy-proven disease, abnormal chest imaging, or symptoms suggestive of thoracic involvement. Evidence demonstrates that CT is effective for detecting pleural effusions and pulmonary metastases, which influence staging and treatment planning. Selective use of chest CT balances improved detection with considerations of radiation exposure and clinical necessity (NCCN, 2026).

PET/CT is supported as a problem-solving tool when CT or MRI findings are inconclusive or discordant. Evidence indicates that PET/CT has high accuracy for detecting metabolically active metastatic disease, improving diagnostic confidence in cases of indeterminate lesions. However, due to cost and potential false positives, its use is best reserved for selected scenarios rather than routine initial staging (NCCN, 2026).

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Ovarian Cancer – Restaging/Recurrence (ONC-21.4)

ON.OC.0021.4.A
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Criteria

- Germ cell tumors and sex cord stromal tumors (granulosa cell tumors), are imaged according to Testicular, Ovarian and Extragonadal Germ Cell Cancer (ONC-20).

Indication	Medically Necessary Imaging Study
Individuals with ovarian cancer with completely resected or definitively treated with chemotherapy and normal(ized) tumor markers	• No advanced imaging is considered medically necessary
ANY of the following in individuals with ovarian cancer: • Unresected disease • Unknown preoperative markers • Difficult or abnormal examination • Elevated LFTs • Elevated tumor markers • Signs or symptoms of recurrence	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) in lieu of CT for individuals with renal insufficiency or contrast allergy. • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for ANY of the following: ◦ Known prior thoracic disease ◦ New or worsening pulmonary symptoms ◦ New or worsening chest x-ray findings ◦ Rising tumor markers

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Indication	Medically Necessary Imaging Study
Monitoring response to neoadjuvant treatment (every 2 cycles, or ~every 6 to 8 weeks) in individuals with ovarian cancer	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) in lieu of CT for individuals with renal insufficiency or contrast allergy. • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for ANY of the following: ◦ Known prior thoracic disease ◦ New or worsening pulmonary symptoms ◦ New or worsening chest x-ray findings
In in individuals with ovarian cancer: • CT negative or inconclusive and CA-125 continues to rise or elevated LFTs • Conventional imaging failed to demonstrate tumor or if persistent radiographic mass with rising tumor markers	ONE of the following: • MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) OR • PET/CT (CPT® 78815)
If both CT and MRI are inconclusive in individuals with ovarian cancer	• PET/CT (CPT® 78815)
If CT, MRI, and PET/CT are inconclusive in individuals with ovarian cancer	• PET/MRI (CPT® 78813 and 76498)

Background and Supporting Information

Restaging and evaluation for recurrence in ovarian cancer rely on clinical assessment, tumor markers, and imaging. Recurrence is common, particularly in advanced-stage epithelial ovarian cancer, and may involve the peritoneum, lymph nodes, liver, and lungs. Serum tumor markers such as CA-125 are frequently used to detect recurrence, often preceding radiographic findings (NCCN, 2026).

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Evidence Discussion

The recommendation to avoid routine advanced imaging in individuals with completely resected disease and normalized tumor markers is supported by evidence showing low yield of imaging in the absence of clinical or biochemical suspicion. Tumor markers such as CA-125 are sensitive for detecting recurrence, and routine imaging in asymptomatic individuals can lead to unnecessary radiation exposure, false-positive findings, and additional interventions without improving outcomes (NCCN, 2026).

When recurrence is suspected based on symptoms, abnormal examination, or rising tumor markers, CT of the abdomen and pelvis with contrast is supported as the primary imaging modality. CT provides comprehensive evaluation of common sites of recurrence, including peritoneal surfaces and visceral organs, and is essential for assessing disease burden and guiding treatment planning. Serial CT imaging during therapy also allows for objective assessment of response to treatment (NCCN, 2026).

MRI is supported as an alternative to CT in individuals with contraindications to contrast or when CT findings are inconclusive. Evidence demonstrates that MRI provides equivalent accuracy for staging and assessment of peritoneal disease, with superior soft tissue contrast that can improve lesion characterization. This makes MRI a valuable adjunct in cases where CT does not adequately explain clinical or laboratory findings (NCCN, 2026).

Chest CT is recommended selectively in patients with known thoracic disease, new pulmonary symptoms, abnormal chest radiographs, or rising tumor markers. Evidence supports its use for detecting pulmonary metastases and pleural effusions, which are important for staging and treatment planning. Selective use balances diagnostic benefit with radiation exposure (NCCN, 2026).

PET/CT is supported for evaluation of indeterminate lesions or discordant clinical scenarios, such as rising CA-125 with negative or inconclusive CT imaging. Evidence indicates that PET/CT has high sensitivity for metabolically active disease and can identify otherwise occult metastases. However, due to cost and potential for false positives, its use is best reserved for problem-solving scenarios. PET/MRI may be considered when all other imaging modalities remain inconclusive, providing combined anatomic and metabolic information (NCCN, 2026).

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Ovarian Cancer – Surveillance (ONC-21.5)

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Criteria

- Germ cell tumors and sex cord stromal tumors (granulosa cell tumors), are imaged according to Testicular, Ovarian and Extragonadal Germ Cell Cancer (ONC-20).

Indication	Medically Necessary Imaging Study
Stages I-III ovarian cancer	• Advanced imaging is not considered medically necessary for surveillance
Measurable metastatic disease on maintenance therapy or being monitored off therapy in individuals with ovarian cancer	Every 3 months for up to 5 years after completion of active treatment: • CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) in lieu of CT for individuals with renal insufficiency. • CT with contrast of previously involved body areas • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for known history of chest involvement

Background and Supporting Information

Surveillance following treatment of ovarian cancer is focused on detection of recurrence while minimizing unnecessary interventions. The majority of recurrences occur within the first several years after treatment, and monitoring typically includes clinical evaluation and tumor marker assessment, particularly CA-125. Imaging is used selectively based on disease status and clinical findings (NCCN, 2026).

Evidence Discussion

The recommendation that advanced imaging is not medically necessary for surveillance in individuals with stage I–III ovarian cancer and no evidence of disease is supported by evidence demonstrating limited benefit of routine imaging in asymptomatic patients. Surveillance based on clinical evaluation and tumor markers, particularly CA-125,

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is sufficient for detecting recurrence in many cases. Routine imaging in this setting may lead to unnecessary radiation exposure, false-positive findings, and additional interventions without improving clinical outcomes (NCCN, 2026).

In contrast, imaging is supported in individuals with measurable metastatic disease or those undergoing maintenance therapy. Serial CT imaging every 3 months allows for objective assessment of disease burden and monitoring of treatment response. This approach is consistent with the biology of advanced ovarian cancer, where disease progression or response to therapy must be evaluated at defined intervals to guide management decisions (NCCN, 2026).

CT of the abdomen and pelvis with contrast is supported as the primary modality for surveillance in patients with active or measurable disease due to its reliability in detecting peritoneal and visceral metastases. MRI serves as an appropriate alternative for individuals with renal insufficiency or contraindications to contrast, providing comparable soft tissue characterization necessary for accurate assessment. This ensures that diagnostic quality is maintained while minimizing risks associated with contrast exposure (NCCN, 2026).

Additional imaging of previously involved body regions, including the chest, is supported when there is known prior involvement or clinical suspicion. Selective chest CT enables detection of pulmonary metastases or pleural effusions that may influence treatment decisions. This targeted approach avoids unnecessary imaging while ensuring clinically significant disease is identified (NCCN, 2026).

Overall, the surveillance strategy reflects a risk-adapted approach that limits imaging in low-risk, asymptomatic individuals while employing regular imaging in those with active disease. This balances the benefits of early detection and treatment monitoring with the potential harms of over-imaging, including radiation exposure, cost, and false-positive findings (NCCN, 2026).

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Uterine Cancer (ONC-22)

Guideline

Uterine Cancer – General Considerations (ONC-22.0)
Uterine Cancer – Suspected/Diagnosis (ONC-22.1)
Uterine Cancer – Initial Work-Up/Staging (ONC-22.2)
Uterine Cancer – Restaging/Recurrence (ONC-22.3)
Uterine Cancer – Surveillance (ONC-22.4)
Gestational Trophoblastic Neoplasia (GTN) (ONC-22.5)
References (ONC-22)

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Uterine Cancer – General Considerations (ONC-22.0)

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Criteria

- Gestational trophoblastic neoplasia (GTN) – see: **Molar Pregnancy and Gestational Trophoblastic Neoplasia (GTN) (PV-16.1)** in the Pelvic Imaging Guidelines.
- Uterine sarcomas are also imaged according to this guideline.
- Staging of uterine cancer is primarily surgical. Advanced imaging is not routinely considered medically necessary pre-operatively for laparoscopic/minimally invasive surgery unless initial staging criteria are met. Pelvic and para-aortic lymphadenectomy can still be performed.

Background and Supporting Information

Uterine cancers include a spectrum of malignancies arising from the endometrium and uterine mesenchyme. The most common histologic subtype is endometrial carcinoma, which is typically adenocarcinoma, while uterine sarcomas represent a less common but biologically distinct group of mesenchymal tumors. These entities are managed within the same general diagnostic and staging framework due to overlapping anatomic involvement and clinical presentation (NCCN, 2026).

Health Equity Considerations

Marked and persistent disparities exist across the uterine cancer care continuum, with Black women experiencing the highest incidence and mortality and the poorest survival outcomes compared with all other racial and ethnic groups. Uterine cancer mortality among Black women is approximately twofold higher than among White women, and 5-year survival remains substantially lower, even after accounting for stage, histology, comorbidities, and treatment factors, underscoring that these inequities are not biologically driven but socially mediated (Somasegar et al., 2023; Whetstone et al., 2022). Black women are more likely to present with advanced-stage disease and aggressive nonendometrioid histologies and are less likely to receive guideline-concordant diagnostic evaluation and timely surgical management (Grubbs et al., 2023; Seay et al., 2024; Whetstone et al., 2022). Hispanic women generally have lower incidence and similar or slightly better overall survival compared with White women, despite rising incidence trends and higher likelihood of later-stage diagnosis, a pattern often described as the "Hispanic paradox" (Rodriguez et al., 2021; Whetstone et al., 2022). Asian women overall demonstrate similar or improved survival compared with

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White women, though outcomes vary by geography, neighborhood socioeconomic status, and migration status, highlighting the importance of disaggregated data (Meade et al., 2025; Whetstone et al., 2022).

Structural and socioeconomic inequities are major drivers of observed disparities in uterine cancer outcomes. Black, Hispanic, and American Indian or Alaska Native women are consistently less likely to receive guideline-adherent treatment, including definitive surgery, minimally invasive approaches, lymph node assessment, and chemotherapy, with lower neighborhood socioeconomic status further compounding these gaps across racial and ethnic groups (Rodriguez et al., 2021; Grubbs et al., 2023; Whetstone et al., 2022). Geographic variation further influences survival, with race-based disparities persisting across both high- and low-diversity regions and even among patients with early-stage, highly treatable disease, suggesting systemic barriers rather than differences in tumor biology or care-seeking behavior alone (Meade et al., 2025). Importantly, disparities persist despite Black women often receiving care at high-volume or academic centers, indicating that access alone is insufficient without equitable delivery of evidence-based imaging, diagnosis, and treatment (Whetstone et al., 2022). Health equity in uterine cancer care requires consistent application of guideline-concordant imaging and management, attention to social determinants of health, and deliberate efforts to mitigate the effects of structural racism and socioeconomic disadvantage on diagnostic timeliness and treatment quality (Somasegar et al., 2023; Whetstone et al., 2022).

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Uterine Cancer – Suspected/Diagnosis (ONC-22.1)

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- See: **Abnormal Uterine Bleeding (PV-2.1)** in the Pelvic Imaging Guidelines for evaluation of suspected uterine malignancies.

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Uterine Cancer – Initial Work-Up/Staging (ONC-22.2)

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Criteria

Indication	Medically Necessary Imaging Study
ANY of the following in individuals with uterine cancer: • Extra-uterine disease suspected • To assess local extent of tumor prior to fertility-sparing surgery for well-differentiated Stage IA (grade 1) uterine cancer • Poor surgical candidate (due to medical comorbidities) considering medical therapy	• MRI Pelvis without and with contrast (CPT® 72197) • Transvaginal ultrasound (CPT® 76830) if MRI is contraindicated • Chest x-ray ◦ CT Chest with contrast (CPT® 71260) for: ▪ New or worsening pulmonary symptoms ▪ New or worsening chest x-ray findings In addition, for surgical staging: • Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
ANY of the following in individuals with uterine cancer: • Abdominal symptoms or abnormal examination findings • Elevated LFTs • Other imaging studies suggest liver involvement	ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160)

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Indication	Medically Necessary Imaging Study
ANY of the following high-risk histologies in individuals with uterine cancer: • Papillary serous • Clear cell • High-grade/poorly differentiated endometrioid carcinoma • Uterine sarcomas: ◦ Carcinosarcoma ◦ Soft tissue sarcoma of the uterus ◦ Leiomyosarcoma ◦ Rhabdomyosarcoma ◦ Undifferentiated sarcoma ◦ Endometrial stromal sarcoma	• CT Chest (CPT® 71260) with contrast and CT Abdomen and Pelvis (CPT® 74177) with contrast • Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
Individuals with uterine cancer with tumors detected incidentally or incompletely staged surgically ***and*** ANY of the following high-risk features: • Myoinvasion greater than 50% • Cervical stromal involvement • Lymphovascular invasion • Tumor greater than 2cm	• CT Chest (CPT® 71260) with contrast and CT Abdomen and Pelvis (CPT® 74177) with contrast
Inconclusive findings on conventional imaging in individuals with uterine cancer	• PET/CT scan (CPT® 78815)

Evidence Discussion

The clinical criteria supporting selective imaging in the initial work-up of uterine cancer are based on evidence that imaging complements, but does not replace, surgical staging. Surgical staging remains the diagnostic gold standard due to its ability to accurately assess depth of invasion and nodal involvement, while imaging primarily assists with preoperative planning and risk stratification. Imaging findings can help identify patients with higher likelihood of extrauterine disease or advanced-stage cancer; however, limitations in detecting microscopic metastases prevent imaging from supplanting surgical staging (Expert Panel on GYN and OB Imaging, 2020; Sbarra et al., 2023; NCCN, 2026).

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MRI of the pelvis without and with contrast is supported as the preferred modality for evaluating local tumor extent when clinically indicated, such as suspected extrauterine disease or assessment prior to fertility-sparing treatment. Evidence demonstrates that MRI provides the highest accuracy for evaluating myometrial invasion and cervical stromal involvement due to its superior soft tissue contrast. Meta-analyses and comparative studies show that contrast-enhanced MRI outperforms ultrasound and CT in assessing tumor depth and local spread, which are critical prognostic factors influencing treatment decisions (Expert Panel on GYN and OB Imaging, 2020; Sbarra et al., 2023).

Transvaginal ultrasound is an appropriate alternative when MRI is contraindicated, with moderate diagnostic accuracy for evaluating myometrial invasion. However, evidence shows that ultrasound is more limited by technical factors, including body habitus, tumor size, and coexisting uterine pathology, and therefore has lower overall accuracy compared with MRI. Its inclusion as an alternative reflects a balance between accessibility and diagnostic performance while maintaining adequate evaluation in patients unable to undergo MRI (Expert Panel on GYN and OB Imaging, 2020; Sbarra et al., 2023).

The criteria recommending chest imaging with escalation to CT for abnormal findings or symptoms reflect evidence that pulmonary metastases are uncommon in low-risk disease and imaging should be symptom-directed. Similarly, CT of the chest, abdomen, and pelvis is supported in patients with suspected metastatic disease, high-risk histologies (e.g., serous, clear cell, carcinosarcoma), or abnormal clinical findings. CT demonstrates utility for detection of nodal and distant metastases, although sensitivity for nodal disease is limited, reinforcing its use in higher-risk populations rather than routine staging of low-risk disease (Expert Panel on GYN and OB Imaging, 2020; Sbarra et al., 2023; NCCN, 2026).

PET/CT is reserved for cases with suspected metastases when conventional imaging is inconclusive. Evidence shows high specificity (~94%) but moderate sensitivity (~72%) for detecting lymph node metastases, supporting its role as a problem-solving tool rather than a first-line modality. The selective use of PET/CT minimizes unnecessary radiation and cost while maintaining diagnostic accuracy in complex or indeterminate cases (Expert Panel on GYN and OB Imaging, 2020; Sbarra et al., 2023).

Lymphatic imaging for surgical staging (e.g., lymphoscintigraphy with or without SPECT/CT) is supported by evidence demonstrating that sentinel lymph node mapping improves detection of nodal metastases with low false-negative rates and reduces morbidity compared with full lymphadenectomy. This approach enhances staging accuracy while limiting complications such as lymphedema, aligning with the criteria supporting targeted lymphatic imaging in appropriate surgical candidates (Expert Panel on GYN and OB Imaging, 2020; NCCN, 2026).

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Uterine Cancer – Restaging/Recurrence (ONC-22.3)

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Criteria

Indication	Medically Necessary Imaging Study
Individuals with uterine cancer with: • Unresected disease • Medically inoperable disease • Incomplete surgical staging • Difficult or abnormal examination • Elevated LFTs or rising tumor markers • Signs or symptoms of recurrence	• CT Chest with contrast (CPT® 71260) **and** • CT Abdomen and Pelvis with contrast (CPT® 74177)
Monitoring response to chemotherapy (every 2 cycles, ~every 6-8 weeks) for individuals with uterine cancer with: • Unresected primary disease • Metastatic disease	• CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Chest with contrast (CPT® 71260) for: ◦ Known prior thoracic disease ◦ New or worsening pulmonary symptoms ◦ New or worsening chest x-ray findings
Any of the following in individuals with uterine cancer: • After fertility sparing treatment • Inconclusive CT scan findings	• MRI Pelvis without and with contrast (CPT® 72197)
• Inconclusive findings on conventional imaging in individuals with uterine cancer	• PET/CT (CPT® 78815)

Background and Supporting Information

Restaging and evaluation for recurrence in uterine cancer are guided by clinical findings, tumor biology, and prior treatment. Most patients with endometrial cancer are diagnosed at an early stage and treated surgically, with relatively favorable outcomes; however, recurrence risk varies based on tumor grade, stage, and histology. Recurrences most

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commonly occur in the pelvis, particularly at the vaginal cuff, but can also involve lymph nodes, peritoneum, liver, and lungs (Reinhold et al., 2020; Salani et al., 2017).

Detection of recurrence relies primarily on clinical assessment, including patient-reported symptoms and physical examination. Imaging is generally reserved for cases in which recurrence is suspected based on abnormal clinical findings, rising tumor markers, or incomplete prior staging. Because most recurrences occur within the first 3 years after treatment, clinical vigilance during this time is critical (Salani et al., 2017).

Evidence Discussion

Evidence strongly supports limiting imaging to individuals with suspected recurrence rather than routine use in asymptomatic patients. Studies demonstrate that most recurrences are detected through symptoms and physical examination, with detection rates exceeding 80% when both are used together. Routine imaging in asymptomatic individuals has low diagnostic yield and does not improve survival outcomes, while increasing cost, radiation exposure, and risk of false-positive findings, supporting a symptom-driven imaging approach (Salani et al., 2017).

CT of the chest, abdomen, and pelvis is supported as the primary imaging modality for evaluation of suspected recurrence or incomplete staging. Evidence shows that CT has substantially higher detection rates in symptomatic individuals (up to ~46%) compared with asymptomatic populations (~4%), reinforcing its appropriate use when clinical suspicion exists. CT also allows comprehensive evaluation of common metastatic sites, including lungs, liver, lymph nodes, and peritoneum, which is essential for treatment planning (Salani et al., 2017; Expert Panel on GYN and OB Imaging, 2020).

MRI of the pelvis is supported in specific clinical scenarios, including evaluation after fertility-sparing treatment or when CT findings are inconclusive. Evidence demonstrates that MRI provides superior soft tissue contrast and allows accurate assessment of local tumor extent, including myometrial invasion and nodal or adnexal involvement. This is particularly important in patients undergoing conservative management, where accurate assessment of residual or recurrent disease directly impacts treatment decisions (Expert Panel on GYN and OB Imaging, 2020; NCCN, 2026).

PET/CT is supported as a problem-solving modality when conventional imaging is inconclusive. Meta-analyses demonstrate high specificity (~94%) and moderate sensitivity (~72%) for detection of metastatic disease, indicating its value in confirming or excluding recurrence in indeterminate cases. However, due to cost, radiation exposure, and limited incremental benefit in routine use, PET/CT is reserved for select scenarios where additional diagnostic clarity is required (Expert Panel on GYN and OB Imaging, 2020; Salani et al., 2017).

For monitoring response to systemic therapy, interval CT imaging is supported because it provides reproducible and objective assessment of tumor burden over time.

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Performing imaging approximately every 2 treatment cycles allows timely identification of progression or response, facilitating appropriate adjustment of therapy. This approach balances the benefit of close disease monitoring with the risks associated with repeated imaging, supporting structured and clinically indicated surveillance (NCCN, 2026).

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Uterine Cancer – Surveillance (ONC-22.4)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I-III of uterine carcinoma	Advanced imaging is not routinely considered medically necessary
Measurable metastatic uterine cancer on maintenance therapy or being monitored off therapy	Every 3 months for up to 5 years after completion of definitive treatment: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved body areas
All stages of uterine sarcoma: • Soft tissue sarcoma of the uterus • Leiomyosarcoma • Adenosarcoma • Carcinosarcoma • Rhabdomyosarcoma • Undifferentiated sarcoma • Endometrial stromal sarcoma	CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) every 3 months for 3 years, then every 6 months for 2 years, and then every 1-2 years until year 10

Background and Supporting Information

Surveillance in uterine cancer is guided by risk of recurrence, disease stage, histology, and prior treatment. Most patients with endometrial carcinoma present with early-stage disease and have favorable outcomes, with recurrence rates ranging from approximately 2% to 15% in early-stage disease and higher in advanced-stage or high-risk histologies. The majority of recurrences occur within the first 3 years following treatment (Salani et al., 2017; NCCN, 2026).

Patterns of recurrence typically involve the pelvis, vaginal cuff, lymph nodes, peritoneum, and lungs. Surveillance strategies vary by disease type, with uterine sarcomas demonstrating higher recurrence rates and a propensity for distant spread,

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including pulmonary and hepatic metastases. These differences in tumor biology inform imaging intensity and duration (Salani et al., 2017; NCCN, 2026).

Evidence Discussion

The recommendation that advanced imaging is not routinely medically necessary for surveillance in stage I–III uterine carcinoma is supported by evidence demonstrating low yield of imaging in asymptomatic individuals. Studies show that the majority of recurrences are detected through symptoms and physical examination, with detection rates exceeding 80% when combined. Routine imaging has not demonstrated improvement in survival outcomes and introduces potential harms, including radiation exposure, false-positive findings, and increased healthcare costs (Salani et al., 2017).

In contrast, imaging plays an important role in patients with measurable metastatic disease or those undergoing maintenance therapy. Serial CT imaging every 3 months allows objective assessment of tumor burden and treatment response, facilitating timely modification of therapy. This approach is supported by evidence demonstrating the need for consistent and reproducible imaging to monitor progression in advanced disease, where clinical examination alone is insufficient (NCCN, 2026).

For uterine sarcomas, the recommendation for more intensive surveillance with CT of the chest, abdomen, and pelvis is supported by their higher recurrence rates and tendency for distant metastasis, particularly to the lungs and liver. Evidence shows that these tumors have recurrence rates exceeding 50% in some subtypes and often recur at distant sites; therefore, periodic imaging is necessary to detect potentially treatable disease and guide management over an extended follow-up period (Salani et al., 2017; NCCN, 2026).

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Gestational Trophoblastic Neoplasia (GTN) (ONC-22.5)

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Criteria

- The most common form of gestational trophoblastic disease (GTD) is hydatidiform mole (HM), a benign form, also known as molar pregnancy.
  - See: **Molar Pregnancy and GTN (PV-16.1)**
- Surveillance is generally with serial monitoring of hCG levels, and advanced imaging is reserved for high-risk histologies where hCG levels may not be a reliable marker.

Indication	Medically Necessary Imaging Study
Initial staging in individuals with GTN	• CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
EITHER of the following in individuals with GTN: • Pulmonary metastases noted on CT scan • Signs/symptoms of CNS involvement	• MRI Brain without and with contrast (CPT® 70553)
EITHER of the following in individuals with GTN: • Monitoring response to systemic therapy (every 2 cycles, i.e., 6-8 weeks) • Suspected progression	• CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Surveillance for any of the following high risk histologies in individuals with GTN: • Placental site trophoblastic tumor (PSTT) • Epithelioid trophoblastic tumor (ETT)	Annually for 2 years: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)

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Background and Supporting Information

Gestational trophoblastic disease (GTD) comprises a spectrum of placental-derived disorders ranging from benign hydatidiform mole (HM) to malignant gestational trophoblastic neoplasia (GTN). GTN includes invasive mole, choriocarcinoma, placental site trophoblastic tumor (PSTT), and epithelioid trophoblastic tumor (ETT), which can metastasize to distant organs such as the lungs, brain, liver, and other sites. Despite metastatic potential, these tumors are highly curable, with treatment often preserving fertility (NCCN, 2026).

Serum human chorionic gonadotropin (hCG) plays a central role in diagnosis, staging, and surveillance of GTN. Most forms of GTN, particularly post-molar disease and choriocarcinoma, produce hCG, allowing for sensitive monitoring of disease activity and treatment response. In contrast, intermediate trophoblastic tumors (PSTT and ETT) produce lower levels of hCG, making imaging more important in their surveillance (NCCN, 2026).

Evidence Discussion

The use of CT chest, abdomen, and pelvis for initial staging of GTN is supported by its ability to detect metastatic disease, particularly in the lungs, which are the most common site of spread. NCCN guidelines recommend comprehensive imaging at diagnosis to determine disease extent and calculate FIGO stage and prognostic score, which directly influence treatment intensity. This approach ensures accurate risk stratification while balancing the need for timely initiation of therapy in a highly curable disease (NCCN, 2026).

Brain MRI is supported in patients with pulmonary metastases or neurologic symptoms due to the risk of central nervous system involvement, particularly in choriocarcinoma, where approximately 20% of patients may develop brain metastases. Early detection of CNS disease is critical because these lesions may require treatment modification and can be associated with significant morbidity if not promptly identified. Selective use of brain imaging therefore maximizes diagnostic yield while avoiding unnecessary imaging in low-risk patients (NCCN, 2026).

For monitoring response to therapy and evaluating suspected progression, repeat CT imaging of the chest, abdomen, and pelvis is supported to assess interval changes in metastatic disease. Although hCG is the primary marker for response assessment, imaging provides complementary anatomic information, particularly in cases of discordant clinical findings or when evaluating residual disease. This combined approach ensures accurate assessment of treatment efficacy and guides ongoing management (NCCN, 2026).

Routine post-treatment imaging is not recommended for most patients with GTN once hCG normalizes because evidence demonstrates that hCG is a highly sensitive marker

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for recurrence. Limiting imaging in this population reduces radiation exposure, cost, and false-positive findings without compromising detection of recurrence. However, for PSTT and ETT, where hCG is less reliable, surveillance imaging is indicated. These tumors may recur without significant hCG elevation, and periodic CT imaging improves detection of recurrence in this subgroup (NCCN, 2026).

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Cervical Cancer (ONC-23)

Guideline

Cervical Cancer – General Considerations (ONC-23.0)
Cervical Cancer – Suspected/Diagnosis (ONC-23.1)
Cervical Cancer – Initial Work-Up/Staging (ONC-23.2)
Cervical Cancer – Restaging/Recurrence (ONC-23.3)
Cervical Cancer – Surveillance (ONC-23.4)
References (ONC-23)

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Cervical Cancer – General Considerations (ONC-23.0)

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Criteria

- Primary histology for cervical cancer is squamous cell. Other, less common histologies are adenosquamous and adenocarcinoma. If biopsy is consistent with one of these less common histologies, it is necessary to clarify that tumor is not of primary uterine origin.
- If the primary histology is uterine in origin, follow imaging recommendations for uterine cancer, see: **Uterine Cancer (ONC-22)**.

Background and Supporting Information

Cervical cancer is a malignancy arising from the cervix, most commonly associated with human papillomavirus (HPV) infection. Histologically, cervical cancers are predominantly squamous cell carcinomas, accounting for approximately 80–90% of cases worldwide, while adenocarcinoma and adenosquamous carcinoma represent less common subtypes. These tumors arise from epithelial cells and demonstrate stromal invasion and variable patterns of growth (NCCN, 2026).

Less common histologies, including adenocarcinoma and adenosquamous carcinoma, may share overlapping morphologic and immunohistochemical features with uterine cancers, particularly endometrial carcinomas. Accurate determination of the primary site is therefore essential, as treatment strategies and staging differ significantly between cervical and uterine malignancies. Pathologic evaluation, including morphology, HPV testing, and immunohistochemical markers, plays a key role in distinguishing primary cervical tumors from tumors of uterine origin (NCCN, 2026).

HPV status is an important biological and prognostic factor in cervical cancer. Most cervical cancers are HPV-associated, particularly squamous cell carcinomas and many adenocarcinomas, while HPV-independent tumors tend to present at a more advanced stage and may have different molecular characteristics and clinical behavior. Determination of HPV status is recommended to support accurate histologic classification and guide clinical management (NCCN, 2026).

Health Equity Considerations

Meaningful health disparities persist across the cervical cancer care continuum, resulting in disproportionate incidence, advanced-stage presentation, and mortality

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among racially and ethnically minoritized populations and individuals facing socioeconomic disadvantage. Black and Hispanic individuals experience higher cervical cancer incidence and mortality compared with non-Hispanic White individuals, with Black patients demonstrating the poorest survival across histologic subtypes and stages, even after accounting for incidence differences (Cohen et al., 2023). Structural factors including lower income, underinsurance, and geographic residence are strongly associated with reduced screening uptake and increased cervical cancer burden, particularly in the Southern United States and in communities with higher levels of neighborhood deprivation (Castellano et al., 2024; Neibart et al., 2025). Although screening is effective in reducing cervical cancer incidence and mortality, disparities in both screening access and timely diagnostic follow-up after abnormal results remain substantial and contribute to later-stage disease at diagnosis (Spencer et al., 2023; Melnikow et al., 2018).

Access to timely, guideline-concordant diagnostic imaging and treatment represents an additional source of inequity. Geographic variation in the availability of specialized oncology services including advanced imaging modalities and brachytherapy centers is associated with higher rates of recurrent or metastatic disease, particularly among patients in rural and low-resource settings who may face transportation, financial, and logistical barriers to care (Castellano et al., 2024; Neibart et al., 2025). Even when screening is completed, downstream inequities such as delays in staging imaging, limited access to MRI or PET/CT, and underuse of brachytherapy disproportionately affect Black, Hispanic, and publicly insured patients, contributing to inferior outcomes (Cohen et al., 2023; Neibart et al., 2025). Ensuring equitable access to evidence-based imaging across all phases of cervical cancer care is critical to reducing preventable disparities and supporting consistent, high-quality oncologic management (Melnikow et al., 2018; Spencer et al., 2023).

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Cervical Cancer – Suspected/Diagnosis (ONC-23.1)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with suspected cervical cancer	• Advanced imaging is not considered medically necessary prior to biopsy

Evidence Discussion

The recommendation that advanced imaging is not medically necessary prior to biopsy in suspected cervical cancer is supported by evidence emphasizing that diagnosis is pathologic and not imaging-based. NCCN guidelines specify that the initial evaluation of suspected cervical cancer requires cervical biopsy and histopathologic confirmation, as imaging cannot establish a definitive diagnosis. Imaging prior to biopsy does not improve diagnostic accuracy and may lead to unnecessary utilization of resources. Avoiding routine imaging prior to biopsy also reduces potential harms, including unnecessary radiation exposure, increased healthcare costs, and incidental findings that may lead to additional testing without clinical benefit. Reliance on tissue diagnosis ensures accurate identification of malignancy and histologic subtype before further staging or treatment planning is undertaken (NCCN, 2026).

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Cervical Cancer – Initial Work-Up/ Staging (ONC-23.2)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with one of the following: • Stage I-IVA cervical cancer • Stage IVB cervical cancer amenable to local treatment	• MRI Pelvis without and with contrast (CPT® 72197)
Stage IB1-IB3 cervical cancer, non-fertility sparing treatment	In addition to MRI Pelvis above, any ONE of the following combinations: • PET/CT (CPT® 78815) or • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) or • PET/MRI (CPT® 78813 and CPT® 76498)
ANY of the following: • Stage 1B1-IB3 cervical cancer, fertility-sparing treatment • Stage II-IVA cervical cancer • Any size cervical cancer incidentally found in a hysterectomy specimen	In addition to MRI Pelvis above, any ONE of the following combinations: • PET/CT (CPT® 78815) or • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) or • CT Chest without contrast (CPT® 71250) and CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
Small cell neuroendocrine carcinoma of the cervix (NECC)	MRI Brain without and with contrast (CPT® 70553) and any ONE of the following combinations: • PET/CT (CPT® 78815) or • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) or • CT Chest without contrast (CPT® 71250) and CT Abdomen and Pelvis with contrast (CPT® 74177)
Inconclusive findings on conventional imaging in individuals with cervical cancer	• PET/CT (CPT® 78815)

Background and Supporting Information

Cervical cancer staging and initial work-up are guided by tumor extent, histology, and risk of metastatic spread. The International Federation of Gynecology and Obstetrics (FIGO) staging system is used and incorporates both clinical and imaging findings. Imaging plays a central role in determining local tumor extent, nodal involvement, and distant metastases, all of which are critical for treatment planning (NCCN, 2026).

Certain histologic subtypes, such as small cell neuroendocrine carcinoma of the cervix, demonstrate more aggressive behavior and a higher propensity for distant metastases, including central nervous system involvement. These characteristics influence imaging strategies and necessitate more comprehensive staging (NCCN, 2026).

Evidence Discussion

MRI of the pelvis without and with contrast is supported as the primary imaging modality for local staging because of its superior soft tissue resolution and ability to accurately evaluate tumor extent. Evidence demonstrates that MRI provides the most reliable assessment of parametrial invasion, tumor size, and adjacent organ involvement, all of which directly influence treatment selection between surgical and non-surgical approaches. Compared to CT, MRI has higher sensitivity and specificity for evaluating local disease, supporting its use as the foundational imaging study in initial staging (NCCN, 2026).

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Systemic imaging with PET/CT or CT of the chest, abdomen, and pelvis is supported for evaluation of nodal and distant metastatic disease, particularly in stage IB and higher disease. NCCN guidelines note that PET/CT is preferred for detecting extra-pelvic disease and guiding treatment decisions, especially when considering definitive local therapies such as surgery or chemoradiation. The ability of PET/CT to identify metabolically active lymph nodes and distant metastases improves staging accuracy and helps avoid inappropriate local treatment in patients with advanced disease. PET/CT is also supported as a problem-solving modality when conventional imaging findings are inconclusive. Its high sensitivity for detecting metabolically active disease provides additional diagnostic clarity in cases where CT or MRI results are equivocal. This targeted use minimizes unnecessary imaging while improving diagnostic confidence and supporting appropriate staging and management decisions (NCCN, 2026).

The use of CT as an alternative imaging modality is supported when PET/CT is not available, although its diagnostic performance is more limited. Evidence demonstrates lower sensitivity for detecting parametrial invasion and nodal disease compared to MRI and PET/CT, but CT remains useful for assessing thoracic and abdominal metastases. Inclusion of chest imaging is important given the potential for pulmonary metastases, particularly in more advanced stages (NCCN, 2026).

For small cell neuroendocrine carcinoma of the cervix, the addition of brain MRI is supported due to the aggressive nature of this histology and higher risk of central nervous system metastases. NCCN recommendations for this subtype are adapted from other neuroendocrine malignancies with known CNS involvement risk. Early identification of brain metastases is clinically important, as it significantly impacts treatment planning and prognosis (NCCN, 2026).

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Cervical Cancer – Restaging/Recurrence (ONC-23.3)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I cervical cancer treated with definitive surgery	• See: **Cervical Cancer – Surveillance (ONC-23.4)**
EITHER of the following: • Stage IB3 cervical cancer • Stage I cervical cancer treated with post-operative adjuvant radiation or chemoradiation due to positive nodes, positive parametria, positive margins, or local cervical factors	• PET/CT (CPT® 78815) 3-6 months post-completion of therapy
Stage II-IV cervical cancer	ONE of the following within 3-6 months of completion of therapy: • PET/CT (CPT® 78815) or • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast)

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Indication	Medically Necessary Imaging Study
Small cell NECC, treated with primary chemoradiation	ONE of the following after completion of therapy: • PET/CT (CPT® 78815) and MRI Brain without and with contrast (CPT® 70553) or • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast and MRI Brain without and with contrast (CPT® 70553)
Inconclusive findings on CT scan or PET/CT in individuals with cervical cancer	MRI Pelvis without and with contrast (CPT® 72197)
Unresectable disease or metastatic disease on systemic treatment in individuals with cervical cancer	Every 2 cycles of treatment (commonly every 6 to 8 weeks): • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of other involved or symptomatic areas
Inconclusive conventional imaging in individuals with cervical cancer	• PET/CT (CPT® 78815)
Suspected or biopsy proven recurrence in individuals with cervical cancer	EITHER of the following, not both: • PET/CT (CPT® 78815) OR • CT Chest (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177)

Background and Supporting Information

Post-treatment evaluation and restaging in cervical cancer are guided by stage at diagnosis, histology, and treatment modality. Following definitive therapy, imaging is used selectively to assess for residual disease, evaluate treatment response, and detect recurrence. The timing and modality of imaging depend on the initial disease stage, presence of risk factors, and treatment approach (NCCN, 2026).

Recurrence patterns include local pelvic recurrence, nodal disease, and distant metastases, with higher-stage disease and high-risk pathologic features associated with

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increased recurrence risk. Imaging in the early post-treatment period is most valuable for patients with advanced disease or high-risk features, where it may influence further management (NCCN, 2026).

Aggressive histologic subtypes, such as small cell neuroendocrine carcinoma of the cervix, have a higher likelihood of distant spread, including central nervous system involvement, and therefore require more comprehensive post-treatment imaging evaluation (NCCN, 2026).

Evidence Discussion

Imaging following primary treatment of cervical cancer is supported in individuals with higher-stage disease or high-risk features to evaluate for residual or metastatic disease. NCCN guidelines recommend post-treatment imaging within 3–6 months for stage IB3 or higher disease and for those treated with chemoradiation or adjuvant therapy, as these populations have a higher likelihood of persistent or recurrent disease. The principal benefit of this approach is early identification of residual tumor or distant metastases that may alter management, including escalation to systemic therapy or selection of salvage interventions (NCCN, 2026).

PET/CT is supported as a preferred modality in many post-treatment scenarios due to its ability to detect metabolically active disease and evaluate the whole body for nodal and distant metastases. NCCN guidance indicates that PET/CT is particularly valuable in advanced-stage disease and in the early post-treatment period to rule out extra-pelvic disease before further treatment decisions are made. CT of the chest, abdomen, and pelvis remains an appropriate alternative when PET/CT is unavailable, offering anatomic assessment of thoracic and abdominal disease, though with comparatively lower sensitivity for small or metabolically active lesions (NCCN, 2026).

For aggressive histologies such as small cell neuroendocrine carcinoma of the cervix, the inclusion of brain MRI in restaging is supported due to the higher risk of central nervous system metastases. This recommendation reflects evidence that these tumors behave more aggressively than typical cervical cancers, with early hematogenous spread, and that detection of CNS involvement has a direct impact on treatment planning and prognosis. Additionally, MRI of the pelvis is supported as a problem-solving modality when CT or PET/CT findings are inconclusive, given its superior soft tissue resolution for evaluating local recurrence or residual disease (NCCN, 2026).

Serial CT imaging in patients with unresectable or metastatic disease undergoing systemic therapy is supported for monitoring treatment response, typically at intervals of approximately every 6–8 weeks (every 2 cycles). This approach provides objective and reproducible assessment of disease burden over time, enabling timely identification of progression or response and facilitating appropriate treatment modification. Across all scenarios, limiting imaging to clinically indicated situations, such as high-risk features, treatment monitoring, or suspected recurrence, balances improved detection of clinically

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meaningful disease with the potential harms of repeated imaging, including radiation exposure, false-positive findings, and increased healthcare costs (NCCN, 2026).

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Criteria

Indication	Medically Necessary Imaging Study
Stage I cervical cancer treated with fertility sparing approach	• MRI Pelvis without and with contrast (CPT® 72197) at 6 months after surgery and then annually for 2-3 years
Small cell NECC	Once, 3-6 months after completion of therapy: • PET/CT (CPT® 78815) Then, every 3 months for 1 year, then every 6 months: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast and MRI Brain without and with contrast (CPT® 70553)
All other individuals with cervical cancer	• No routine advanced imaging is considered medically necessary in asymptomatic individuals.

Background and Supporting Information

Surveillance following treatment for cervical cancer is primarily guided by clinical evaluation, including history and physical examination, with imaging reserved for specific clinical scenarios. Most recurrences are detected based on symptoms or examination findings rather than routine imaging. The NCCN emphasizes risk-adapted follow-up strategies based on stage, treatment modality, and histology, with imaging used selectively when it is likely to impact management (NCCN, 2026).

Evidence Discussion

The recommendation to perform MRI pelvis imaging at defined intervals following fertility-sparing treatment for stage I cervical cancer is supported by NCCN guidance indicating that MRI provides the most accurate assessment of residual or recurrent local disease in the preserved cervix. MRI's superior soft tissue contrast allows for detailed evaluation of tumor recurrence and anatomical changes after surgery. This targeted

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use of imaging improves detection of clinically significant recurrence while limiting unnecessary imaging in lower-risk populations (NCCN, 2026).

For small cell neuroendocrine carcinoma, more intensive imaging surveillance is supported due to the aggressive biology and high propensity for early distant metastases, including to the brain. NCCN recommends comprehensive imaging, including PET/CT and brain MRI, following completion of therapy. Although specific surveillance intervals are not explicitly defined for this subtype in cervical cancer, extrapolation from neuroendocrine tumor surveillance practices is supported by the similar metastatic patterns and clinical behavior. This approach facilitates early detection of recurrence in a population at high risk for rapid disease progression (NCCN, 2026).

The recommendation against routine advanced imaging in asymptomatic individuals with other cervical cancer histologies is supported by evidence demonstrating limited clinical benefit of imaging in this setting. NCCN indicates that imaging should be based on symptoms or clinical concern for recurrence, as routine imaging has low yield for detecting asymptomatic disease and does not clearly improve survival outcomes. Avoiding routine imaging reduces unnecessary radiation exposure, minimizes false-positive findings, and decreases healthcare costs (NCCN, 2026).

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Anal Cancer & Cancers of the External Genitalia (ONC-24)

Guideline

Anal Carcinoma – General Considerations (ONC-24.0)
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Anal Carcinoma – General Considerations (ONC-24.0)

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Criteria

- Adenocarcinoma of the anal canal is managed as rectal cancer according to **Colorectal and Small Bowel Cancer (ONC-16)**.
- Squamous cell carcinoma of the perianal region (up to 5cm radius from the anal verge) are imaged according to anal carcinoma guidelines.
- Bowen's disease and Paget's disease of the perianal and perigenital skin are considered non-invasive/in-situ conditions and do not routinely require advanced imaging. See: **Non-Melanoma Skin Cancers – Initial Work-up/Staging (ONC-5.6)**.

Background and Supporting Information

Anal carcinoma is a relatively uncommon malignancy arising from the anal canal or perianal region. The majority of anal cancers are squamous cell carcinomas (SCC), which represent the dominant histologic subtype and are associated with human papillomavirus (HPV) infection. Other less common histologies include transitional or cloacogenic carcinomas, which are now largely grouped under the broader category of squamous cell carcinoma due to similar biological behavior and prognosis (NCCN, 2026).

The anal region includes both the anal canal and perianal skin, which have distinct anatomic and histologic characteristics but may be involved simultaneously by tumor. Squamous cell carcinomas arising within the anal canal or perianal region are managed under anal carcinoma treatment paradigms due to shared biology and patterns of spread, including lymphatic drainage to inguinal and pelvic nodes (NCCN, 2026).

Other malignancies that may occur in the anal region differ significantly in their biology and management. Anal adenocarcinoma originates from glandular epithelium and demonstrates clinical behavior similar to rectal adenocarcinoma. Therefore, these tumors are managed according to colorectal cancer treatment principles rather than anal carcinoma guidelines (NCCN, 2026).

Non-invasive conditions of the perianal skin, including Bowen's disease (squamous cell carcinoma in situ) and Paget's disease, are confined to the epithelium without stromal invasion. These lesions lack metastatic potential and therefore do not require advanced imaging in routine evaluation, with management instead guided by dermatologic and local treatment principles (NCCN, 2026).

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Health Equity Considerations

Anal carcinoma is a relatively rare malignancy, yet its incidence continues to rise disproportionately among populations experiencing socioeconomic disadvantage and structural barriers to care. Epidemiologic studies demonstrate that anal cancer occurs more frequently in communities with higher rates of poverty and greater proportions of racial and ethnic minoritized populations, with substantially higher incidence observed in zip codes characterized by concentrated socioeconomic deprivation (Oliveira et al., 2020). These disparities are compounded by unequal exposure to key risk factors, including higher prevalence of oncogenic human papillomavirus (HPV) infection, immunosuppression, and limited access to preventive services. Globally, inequities in HPV vaccine uptake and cancer surveillance infrastructure further contribute to widening disparities, particularly in low- and middle-income countries where anal cancer incidence is projected to increase as HPV prevalence remains high and vaccination coverage remains limited (Pedersen et al., 2025).

Disparities in outcomes are also driven by differential access to timely diagnosis, staging, and treatment. Populations at highest risk, such as individuals living with HIV, men who have sex with men, and those with prior HPV-related malignancies, often face barriers to early evaluation and consistent follow-up, increasing the likelihood of more advanced disease at presentation (Pedersen et al., 2025). Within the United States, patients residing in structurally disadvantaged communities may experience delays in diagnostic imaging, fragmented care coordination, and reduced access to specialized oncology services, all of which may adversely affect treatment outcomes (Oliveira et al., 2020). Addressing health equity in anal carcinoma requires improving access to preventive strategies, ensuring equitable availability of evidence-based imaging and staging, and supporting health system interventions that reduce diagnostic delays for populations disproportionately burdened by disease (Pedersen et al., 2025).

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Anal Carcinoma – Suspected/Diagnosis (ONC-24.1)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with suspected anal carcinoma	• No advanced imaging prior to biopsy

Evidence Discussion

The recommendation that no advanced imaging is medically necessary prior to biopsy in suspected anal carcinoma is supported by evidence that diagnosis and initial staging are fundamentally clinical and pathologic processes. NCCN guidelines emphasize that a tissue diagnosis is required, and most anal cancers are staged clinically based on direct physical examination, anoscopy, and histologic confirmation rather than imaging. This approach ensures that diagnosis is accurate and avoids reliance on imaging modalities that cannot definitively distinguish malignant from benign or premalignant lesions (NCCN, 2026).

Advanced imaging prior to biopsy does not improve diagnostic accuracy and may lead to unnecessary testing. Imaging modalities such as CT or PET/CT are intended for evaluation of disease extent after diagnosis, including assessment of nodal involvement and distant metastases, rather than for primary detection. NCCN guidance indicates that imaging is part of the staging work-up after histologic confirmation, reinforcing that biopsy is the essential first step in establishing the presence of malignancy (NCCN, 2026).

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Anal Carcinoma – Initial Work-up/ Staging (ONC-24.2)

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Criteria

Indication	Medically Necessary Imaging Study
All individuals with anal carcinoma	• CT Chest with contrast (CPT® 71260) and Any ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)
• Stage II-III Squamous Cell Carcinoma of the Anal Canal and no evidence of metastatic disease by conventional imaging • Inconclusive findings on conventional imaging in individuals with anal carcinoma	• PET/CT (CPT® 78815)

Background and Supporting Information

Initial work-up and staging of anal carcinoma are based on clinical evaluation combined with imaging to assess local disease extent, nodal involvement, and distant metastases. Anal cancer is most commonly a squamous cell carcinoma and demonstrates characteristic patterns of spread, including regional lymph node involvement and, less commonly, distant metastases to liver and lungs. Accurate staging is essential for treatment planning, as management varies depending on disease extent and presence of metastatic disease (NCCN, 2026; Valvo et al., 2019).

Evidence Discussion

The recommendation for CT chest with contrast and CT abdomen/pelvis with contrast, or CT abdomen with contrast and MRI pelvis, is supported by evidence demonstrating

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that cross-sectional imaging is necessary to evaluate the extent of disease beyond the primary tumor. CT imaging provides critical information regarding distant metastatic spread, including involvement of the lungs, liver, retroperitoneum, and nodal basins, which cannot be determined by physical examination alone. This information directly influences staging and treatment selection, particularly in distinguishing localized from metastatic disease (NCCN, 2026; Valvo et al., 2019).

MRI pelvis is supported as an alternative component of staging due to its superior soft tissue resolution for local tumor assessment. Evidence indicates that MRI is more accurate than CT in evaluating local invasion of adjacent structures, including sphincter muscles and pelvic organs, and in assessing mesorectal lymph nodes. This improved anatomic detail enhances treatment planning, particularly for radiation therapy and organ-preserving approaches (NCCN, 2026; Valvo et al., 2019).

The use of PET/CT in stage II–III disease without evidence of metastasis on conventional imaging, or for inconclusive findings, is supported by evidence demonstrating its added value in detecting nodal and distant disease. PET/CT has been shown to identify metabolically active lymph nodes not detected on CT and to alter nodal status and TNM staging in a substantial proportion of patients, with reported changes in staging in up to 41% of cases. This improved staging accuracy can influence radiation field design and overall treatment strategy, preventing under- or overtreatment. Despite its utility, PET/CT is not recommended as a replacement for diagnostic CT because it may have limitations in detecting small lesions and does not provide the same level of anatomic detail. Therefore, PET/CT is used as a complementary modality rather than a primary staging tool. This approach balances the benefits of improved detection of metabolically active disease with the need to avoid unnecessary imaging, additional radiation exposure, and increased cost when conventional imaging is sufficient (NCCN, 2026; Valvo et al., 2019).

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Anal Carcinoma – Restaging/Recurrence (ONC-24.3)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I anal carcinoma treated with complete surgical resection	• See: **Anal Carcinoma – Surveillance (ONC-24.4)** for surveillance guidelines
Stages I, II and III anal carcinoma – post chemoradiation evaluation	• CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) AND any ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Metastatic (stage IV) anal carcinoma	• CT Abdomen and Pelvis with contrast (CPT® 74177) every 2 cycles (generally 6 to 8 weeks) on treatment • CT Chest with contrast (CPT® 71260) if chest x-ray is abnormal or if symptoms of chest involvement
In individuals with anal carcinoma: • Difficult or abnormal examination • Elevated LFTs • Signs or symptoms of recurrence • Biopsy proven recurrence	Preferably using same imaging studies as used in initial imaging: • CT Chest (CPT® 71260) with contrast and Any ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
Individuals with anal carcinoma with biopsy proven recurrence and inconclusive conventional imaging	• PET/CT (CPT® 78815)

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Background and Supporting Information

Anal carcinoma restaging and recurrence evaluation are guided by disease stage, treatment modality, and risk of recurrence. Most anal cancers are squamous cell carcinomas treated with chemoradiation, and clinical response assessment may be delayed due to the known slow tumor regression following therapy. Imaging plays a complementary role to clinical assessment by evaluating residual disease, nodal involvement, and distant metastases, particularly when findings are unclear on examination (NCCN, 2026).

Recurrence patterns include local pelvic recurrence, regional nodal recurrence (inguinal or pelvic nodes), and distant metastases, most commonly involving the liver or lungs. Early-stage disease treated with local excision carries a lower risk of recurrence, while higher-stage disease treated with chemoradiation has a higher likelihood of locoregional or distant relapse. Imaging strategies are tailored accordingly, with more intensive evaluation in higher-risk or symptomatic populations (NCCN, 2026).

Evidence Discussion

The recommendation that stage I anal carcinoma treated with complete surgical resection follow surveillance without routine imaging is supported by NCCN guidance demonstrating a relatively low risk of recurrence in this population. Clinical follow-up with physical examination and anoscopy is the primary method of detecting recurrence. Routine imaging in asymptomatic individuals has limited yield and may expose patients to unnecessary radiation, false-positive findings, and increased cost without improving outcomes (NCCN, 2026).

For stage I–III disease treated with chemoradiation, post-treatment imaging with CT chest and CT abdomen/pelvis or MRI abdomen/pelvis is supported to assess treatment response and identify residual or recurrent disease. NCCN notes that cross-sectional imaging provides important information on locoregional and distant disease that cannot be fully assessed clinically, particularly given the delayed tumor regression characteristic of anal carcinoma. This imaging helps guide decisions regarding continued observation versus biopsy or salvage therapy (NCCN, 2026).

In metastatic (stage IV) disease, serial CT imaging of the abdomen and pelvis every two cycles of systemic therapy is supported for monitoring treatment response and disease progression. CT provides reproducible, objective assessment of tumor burden, enabling timely adjustments in therapy. Chest imaging is performed selectively when clinically indicated (e.g., abnormal chest x-ray or symptoms), reflecting the goal of balancing appropriate disease monitoring with minimization of unnecessary imaging exposure (NCCN, 2026).

For suspected or biopsy-proven recurrence, CT chest combined with CT abdomen/pelvis or MRI abdomen/pelvis is recommended, preferably using the same imaging

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modalities as initial staging to allow accurate comparison over time. PET/CT is supported for biopsy proven recurrence when conventional imaging is inconclusive, as it provides additional functional information that can clarify indeterminate findings. This stepwise imaging approach optimizes diagnostic accuracy while minimizing redundant imaging, radiation exposure, and cost, ensuring imaging is used when it meaningfully impacts patient management (NCCN, 2026).

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Anal Carcinoma – Surveillance (ONC-24.4)

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Criteria

Indication	Medically Necessary Imaging Study
Stage I anal carcinoma	• Advanced imaging is not routinely considered medically necessary for surveillance
• Stage II anal carcinoma • Stage III anal carcinoma • Local recurrence of anal carcinoma treated definitively	• CT Chest (CPT® 71260) with contrast or CT Chest without contrast (CPT® 71250) annually for 3 years • And ANY one of the following annually for three years: ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Stage IV anal carcinoma – measurable metastatic disease on maintenance treatment or being observed off treatment	Every 3 months for up to 5 years after completion of all treatment: • CT Chest (CPT® 71260) with contrast • CT Abdomen and Pelvis with contrast (CPT® 74177)

Background and Supporting Information

Surveillance after treatment for anal carcinoma is primarily based on clinical evaluation, with imaging used selectively according to stage and risk of recurrence. Most anal cancers are squamous cell carcinomas treated with chemoradiation, and patterns of recurrence include local, regional nodal, and distant metastatic disease. The risk of recurrence varies by stage, with lower risk in stage I disease treated definitively and higher risk in stage II–III and metastatic disease (NCCN, 2026).

Evidence Discussion

The recommendation that advanced imaging is not routinely considered medically necessary for stage I anal carcinoma is supported by NCCN guidance indicating that

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early-stage disease has a relatively low risk of recurrence following definitive treatment. Most recurrences are detected through clinical examination rather than imaging. Routine imaging in asymptomatic individuals has low diagnostic yield and may expose patients to unnecessary radiation, false-positive findings, and increased healthcare costs without improving outcomes (NCCN, 2026).

For stage II–III disease and individuals treated definitively for local recurrence, annual imaging with CT chest (with or without contrast) combined with CT abdomen/pelvis or MRI abdomen/pelvis is supported to detect recurrence or metastatic disease. NCCN recommends cross-sectional imaging annually for 3 years in higher-risk populations, as these patients have a greater likelihood of recurrence, particularly within the first few years after treatment. This imaging provides assessment of distant metastases and complements clinical examination, improving early detection of clinically significant recurrence (NCCN, 2026).

In patients with stage IV disease who have measurable metastatic disease and are on maintenance therapy or observation, more frequent imaging is supported. CT chest and CT abdomen/pelvis every 3 months for up to 5 years allows for close monitoring of disease stability or progression. This frequent surveillance enables timely identification of progression and supports ongoing treatment decision-making. The higher imaging frequency reflects the significantly increased risk of progression in metastatic disease compared to earlier stages (NCCN, 2026).

NCCN specifically notes that FDG PET/CT is not indicated for routine surveillance following definitive treatment of localized disease, as it has not demonstrated additional benefit over conventional imaging in this setting and may increase unnecessary radiation exposure and false-positive findings. Overall, the surveillance strategy balances the benefits of early detection of recurrence in higher-risk populations with the harms of over-imaging in low-risk individuals, ensuring imaging is used when it is most likely to influence clinical management (NCCN, 2026).

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Cancers of External Genitalia – General Considerations (ONC-24.5)

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Criteria

- These imaging guidelines are applicable for squamous cell carcinomas arising from the vulva, vagina, penis, urethra, and scrotum.

Background and Supporting Information

Cancers of the external genitalia encompass malignancies arising from the vulva, vagina, penis, urethra, and scrotum. Across these anatomic sites, squamous cell carcinoma (SCC) is the predominant histologic subtype and forms the basis for unified imaging considerations. These tumors share common etiologic factors, including human papillomavirus (HPV) infection and chronic inflammatory conditions, and demonstrate similar patterns of local invasion and lymphatic spread, particularly to regional inguinal and pelvic lymph nodes (NCCN, 2026).

The external genital anatomy includes cutaneous and mucosal surfaces with distinct lymphatic drainage pathways that converge on regional nodal basins. For example, penile and vulvar cancers commonly spread to inguinal lymph nodes, while vaginal cancers may involve pelvic nodal chains. These shared anatomic and biologic features support a unified conceptual framework for imaging evaluation of squamous malignancies arising in these regions (NCCN, 2026).

Although less common histologies may occur, including adenocarcinoma or melanoma, these entities often require disease-specific management approaches. In contrast, squamous cell carcinomas across external genital sites demonstrate consistent clinical behavior and treatment paradigms, including surgical resection, radiation therapy, and systemic therapy based on stage and nodal involvement (NCCN, 2026).

Health Equity Considerations

Cancers of the external genitalia—including penile, vulvar, and vaginal cancers—are rare malignancies, yet they demonstrate marked and persistent health disparities across racial, ethnic, socioeconomic, and geographic groups. Population-based studies in the United States show substantial variation in incidence and mortality by race and region, with higher incidence of vulvar cancer among White and American Indian/ Alaska Native individuals and higher mortality among Black individuals, particularly for vulvar and vaginal cancers (Zhou & Yue, 2022; Zhang et al., 2025). For penile cancer,

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Hispanic and Black men experience higher stages at diagnosis and worse survival despite lower or comparable incidence, reflecting inequities downstream from prevention and early detection (Akinyema et al., 2023; Ogbuji et al., 2024). These patterns are closely tied to social determinants of health, including lower educational attainment, residence in socioeconomically deprived or rural areas, lack of insurance, and reduced access to preventive services such as HPV vaccination and early specialty evaluation (Angulo-Lozano et al., 2022; Mansur et al., 2024).

Disparities are further amplified by unequal access to timely, guideline-concordant diagnostic imaging, staging, and specialty care. Patients from marginalized communities are more likely to experience delays in diagnosis, present with locally advanced or metastatic disease, and require more radical surgical interventions, particularly in penile cancer, where limited access to primary and tertiary care is strongly associated with adverse outcomes and higher mortality (Angulo-Lozano et al., 2022; Ogbuji et al., 2024). Similar patterns are observed in vulvar and vaginal cancers, where Black patients are less likely to receive appropriate multimodal therapy and experience longer delays from diagnosis to treatment, contributing to inferior outcomes even after adjustment for stage (Towner et al., 2022; Zhou & Yue, 2022). Ensuring equitable access to evidence-based imaging, timely staging, and specialized oncologic care alongside prevention strategies such as HPV vaccination and patient education is essential to mitigating disparities and improving outcomes for cancers of the external genitalia (Mansur et al., 2024; Zhang et al., 2025).

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Cancers of External Genitalia – Initial Work-Up/Staging (ONC-24.6)

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Criteria

Indication	Medically Necessary Imaging Study
Clinical node negative **vulvar** cancer with ANY of the following: • Lesion greater than 2cm • Any size with stromal invasion greater than 1mm	• For planned sentinel lymph node evaluation: Lymph system imaging (lymphoscintigraphy, CPT® 78195) ◦ SPECT/CT (CPT® 78830) if requested
For stage II or higher **vulvar** cancer or suspected metastatic vulvar cancer based on one of the following: • Abnormal physical exam findings • Bulky vulvar tumor (≥4cm or close to critical structures) • Vaginal, urethral, or anal involvement • Delay in presentation or treatment • Pelvic, abdominal, or pulmonary symptoms	ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) OR • CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197) For individuals with signs/symptoms of chest involvement or abnormal findings on chest x-ray: • CT Chest with contrast (CPT® 71260)

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Indication	Medically Necessary Imaging Study
Vaginal carcinoma	ONE of the following combinations: • PET/CT (CPT® 78815) and MRI Pelvis without and with contrast (CPT® 72197) or • CT Abdomen and Pelvis with contrast (CPT® 74177) and CT Chest with contrast (CPT® 71260) or • CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197) and CT Chest with contrast (71260)
Penile carcinoma with ANY of the following: • Non-palpable inguinal lymph nodes and intermediate or high-risk lesion (T1b or any T2 or greater) • Palpable inguinal lymph nodes • Difficult pelvic node assessment on physical exam	CT Chest with contrast (CPT® 71260) AND Any ONE of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)
In individuals with cancers of the external genitalia: • Inconclusive findings on conventional imaging • Pelvic nodes enlarged but biopsy not technically feasible	• PET/CT (CPT® 78815)

Background and Supporting Information

Initial work-up and staging of cancers of the external genitalia, including vulvar, vaginal, and penile squamous cell carcinomas, require integration of clinical examination and imaging to assess tumor extent, nodal involvement, and distant metastatic disease. These malignancies share common patterns of spread, particularly through lymphatic

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pathways to inguinal and pelvic lymph nodes, and staging is critical for determining treatment strategy and prognosis (NCCN, 2026).

Evidence Discussion

The recommendation for lymphoscintigraphy in clinically node-negative vulvar cancer with lesions >2cm or stromal invasion >1mm is supported by NCCN guidance emphasizing the importance of lymphatic spread in vulvar carcinoma. Sentinel lymph node mapping is essential for accurate staging because disease dissemination occurs through superficial lymphatic channels. Lymphatic imaging techniques such as lymphoscintigraphy improve identification of sentinel nodes and guide surgical staging, minimizing unnecessary full lymphadenectomy and associated morbidity while maintaining staging accuracy (NCCN, 2026).

For stage II or higher vulvar cancer or when metastatic disease is suspected, cross-sectional imaging with CT abdomen and pelvis or MRI pelvis (with CT abdomen) is supported to evaluate extent of disease. NCCN notes that imaging is indicated when there are abnormal exam findings, large tumors, or suspicion for local extension or distant metastasis. CT provides comprehensive evaluation for abdominal and pelvic metastases, while MRI offers improved delineation of local tumor invasion and involvement of adjacent structures. CT chest is recommended when symptoms or abnormal chest imaging suggest thoracic involvement, ensuring targeted evaluation while avoiding unnecessary imaging in asymptomatic individuals (NCCN, 2026).

In vaginal carcinoma, NCCN identifies PET/CT as the preferred imaging modality for evaluation of metastatic disease, with CT chest/abdomen/pelvis as an acceptable alternative. PET/CT offers improved detection of metabolically active nodal and distant disease compared with conventional imaging. MRI pelvis is recommended in conjunction with PET/CT or CT to assess local tumor extent, as it provides superior soft tissue resolution for defining tumor size, depth, and involvement of adjacent pelvic organs. The combination of metabolic and anatomic imaging improves staging accuracy and informs treatment planning (NCCN, 2026).

For penile carcinoma, cross-sectional imaging of the chest, abdomen, and pelvis with CT or MRI is supported in patients with intermediate- or high-risk primary tumors, palpable lymph nodes, or difficulty in clinical nodal assessment. NCCN emphasizes that inguinal lymph node status is the most important prognostic indicator in penile cancer, and imaging is critical when nodal involvement is suspected or cannot be adequately assessed on examination. MRI provides additional information regarding depth of tumor invasion, while CT is useful for assessing nodal and distant disease (NCCN, 2026).

PET/CT is recommended as a problem-solving tool for inconclusive findings on conventional imaging or when pelvic nodes are enlarged but biopsy is not technically feasible. NCCN notes that PET/CT has higher sensitivity in patients with node-positive disease and can detect metabolically active nodes not identified on CT or MRI.

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However, PET/CT is not used as a first-line modality in all cases due to limitations in detecting small-volume disease and higher cost and radiation exposure. Its selective use balances improved diagnostic accuracy with the need to avoid unnecessary imaging (NCCN, 2026).

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Cancers of External Genitalia – Restaging/Recurrence (ONC-24.7)

ON.AN.0024.7.A
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Criteria

Indication	Medically Necessary Imaging Study
In individuals with cancers of external genitalia: • Difficult or abnormal examination • Elevated LFTs • Signs or symptoms of recurrence • Biopsy proven recurrence	• CT Chest with contrast (CPT® 71260) And ANY one of the following: • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast
EITHER of the following in individuals with cancers of the external genitalia: • individuals receiving systemic treatment for measurable disease • At the end of definitive therapy	Any ONE of the following, every 2 cycles (generally 6 to 8 weeks) during treatment at the end of planned chemotherapy treatment: • CT Abdomen and Pelvis with contrast (CPT® 74177) or • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast or • CT Abdomen with contrast (CPT® 74160) and MRI Pelvis (CPT® 72197) AND • CT Chest with contrast (CPT® 71260)
Vaginal primary tumor treated with upfront radiation therapy	• PET/CT (CPT® 78815) at least 12 weeks after completion of radiation therapy ◦ MRI Pelvis without and with contrast (CPT® 72197) is medically necessary if PET/CT not available (can be performed sooner than 12 weeks after completion of therapy) ◦ MRI Pelvis without and with contrast (CPT® 72197) is medically necessary for clarification of PET/CT findings

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Indication	Medically Necessary Imaging Study
Vulvar carcinoma following definitive primary therapy with chemoradiation or surgery	3-6 months after primary therapy: • MRI Pelvis without and with contrast (CPT® 72197)
Inconclusive findings on conventional imaging in individuals with cancers of the external genitalia	• PET/CT (CPT® 78815)

Background and Supporting Information

Restaging and recurrence evaluation in cancers of the external genitalia, including vulvar, vaginal, and penile squamous cell carcinomas, relies on imaging to assess treatment response, detect residual disease, and identify locoregional or distant recurrence. These malignancies share common recurrence patterns involving the primary site, regional lymph nodes (inguinal and pelvic), and distant organs such as the lungs and liver (NCCN, 2026.

Evidence Discussion

The use of CT chest combined with CT abdomen/pelvis or MRI abdomen/pelvis for individuals with suspected or confirmed recurrence is supported by NCCN guidance indicating that imaging should be performed in the presence of abnormal examination findings, symptoms, or biochemical abnormalities. These modalities provide comprehensive assessment of locoregional and distant disease, including evaluation of lung, liver, and nodal metastases, which are common sites of spread in external genital malignancies. This approach ensures accurate detection of recurrence while avoiding unnecessary imaging in asymptomatic patients (NCCN, 2026).

For individuals receiving systemic therapy or undergoing post-treatment evaluation, serial imaging every 2 cycles is supported to monitor treatment response and disease progression. NCCN guidance emphasizes that cross-sectional imaging provides objective and reproducible assessment of tumor burden over time, allowing timely adjustments in therapy. This structured interval balances the need for close monitoring of active disease with the risks of repeated imaging, including radiation exposure and cost (NCCN, 2026).

In vaginal carcinoma treated with radiation therapy, PET/CT is supported at least 12 weeks after treatment completion to assess response. NCCN notes that delayed imaging reduces false-positive findings related to post-radiation inflammation and improves diagnostic accuracy for residual disease. MRI pelvis is recommended when

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PET/CT is unavailable or for clarification of indeterminate findings due to its superior soft tissue resolution for evaluating local tumor extent (NCCN, 2026).

For vulvar carcinoma following definitive therapy, MRI pelvis at 3–6 months is supported to assess local treatment response and reevaluate lymph node involvement. MRI provides detailed anatomic information that is critical for distinguishing residual tumor from post-treatment changes. PET/CT is reserved for inconclusive findings on conventional imaging, as it offers functional assessment of disease activity but is not routinely required in all cases due to cost, radiation exposure, and potential false positives. This stepwise imaging strategy maximizes diagnostic accuracy while minimizing unnecessary imaging (NCCN, 2026).

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Cancers of External Genitalia – Surveillance (ONC-24.8)

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Criteria

Indication	Medically Necessary Imaging Study
• All stages of vulvar and vaginal cancers	• See: **ONC-24.7** for post-treatment imaging 3-6 months after completion of therapy. No additional routine advanced imaging for asymptomatic surveillance.
• Penile Cancer: stage I-IIIA	• CT Abdomen and Pelvis with contrast (CPT® 74177) every 6 months for 2 years, and then every 12 months for 2 years
• Penile cancer: stages IIIB-IV	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) every 3 months for one year, then every 6 months for 3 more years

Background and Supporting Information

Surveillance of cancers of the external genitalia, including vulvar, vaginal, and penile squamous cell carcinomas, is guided by stage, tumor biology, and risk of recurrence. These malignancies share patterns of recurrence involving the primary site, regional lymph nodes (especially inguinal and pelvic nodes), and distant metastases such as lung or liver involvement. Clinical follow-up with history and physical examination is the cornerstone of surveillance, with imaging used selectively based on risk and symptoms (NCCN, 2026).

Evidence Discussion

The recommendation that no routine advanced imaging is considered medically necessary for surveillance of vulvar and vaginal cancers in asymptomatic individuals is supported by NCCN guidance emphasizing the primary role of clinical evaluation in follow-up. Evidence indicates that most recurrences are detected through physical examination or symptom assessment rather than imaging. Routine imaging has low diagnostic yield in this population and may introduce harms such as radiation exposure,

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false-positive findings, and increased healthcare costs without improving survival outcomes (NCCN, 2026).

For penile cancer stage I–IIIA, surveillance imaging with CT abdomen and pelvis at defined intervals is supported due to the risk of nodal and distant recurrence. NCCN guidance indicates that cross-sectional imaging is useful for detecting asymptomatic disease, particularly in patients at intermediate risk of recurrence. While chest imaging may be performed with radiography in some cases, CT abdomen and pelvis provides more comprehensive evaluation of retroperitoneal and pelvic lymph nodes, which are common sites of disease progression (NCCN, 2026).

In higher-stage penile cancer (stage IIIB–IV), more intensive surveillance with CT chest and CT abdomen and pelvis is supported due to the significantly increased risk of distant metastases, including pulmonary involvement. NCCN recommendations reflect the aggressive nature of advanced disease and the need for closer monitoring, particularly in the first years following treatment when recurrence risk is highest. More frequent imaging allows for earlier detection of progression and facilitates timely intervention, which may impact prognosis and treatment options (NCCN, 2026).

Overall, the surveillance imaging strategy reflects a risk-adapted approach. Limiting imaging in vulvar and vaginal cancers reduces unnecessary interventions and associated harms in low-risk, asymptomatic populations, while structured imaging in penile cancer, especially advanced stages, enhances detection of clinically significant recurrence. This approach balances the benefits of early detection with the risks of over-imaging, including radiation exposure, incidental findings, and increased cost, ensuring imaging is used when it is most likely to influence clinical management (NCCN, 2026).

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Multiple Myeloma and Plasmacytomas (ONC-25)

Guideline

Multiple Myeloma and Plasmacytomas – General Considerations (ONC-25.0)
Multiple Myeloma and Plasmacytomas –Suspected/Diagnosis (ONC-25.1)
Multiple Myeloma and Plasmacytomas – Initial Work-Up/Staging (ONC-25.2)
Multiple Myeloma and Plasmacytomas – Restaging/Recurrence (ONC-25.3)
Multiple Myeloma and Plasmacytomas – Surveillance (ONC-25.4)
References (ONC-25)

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Multiple Myeloma and Plasmacytomas – General Considerations (ONC-25.0)

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Criteria

- Multiple myeloma group of disorders can be classified as below, which influence imaging modality of choice.

Condition	Monoclonal protein	Bone marrow plasma cells	CRAB criteria**
Solitary Plasmacytoma (biopsy proven tumor containing plasma cells)	<3gm/dL	Absent	Absent
Monoclonal Gammopathy of Unknown Significance (MGUS)	<3gm/dL	<10%	Absent
Smoldering Myeloma (SMM) (stage I MM or asymptomatic MM)	≥3gm/dL	10% - 60%	Absent
Multiple Myeloma (MM)	≥3gm/dL	≥10%	Present

**CRAB criteria = hypercalcemia, renal insufficiency, anemia, lytic bony lesions

- Diagnosis and monitoring of response to therapy is primarily with laboratory studies that include urine and serum monoclonal protein levels, serum-free light chain levels, LDH and beta-2 microglobulin. Routine advanced imaging to monitor response to treatment is not considered medically necessary.
- Rarely, (<5%), an individual may have nonsecretory myeloma, which does not produce measurable M-protein. These individuals require imaging as primary method to monitor disease.
- Other conditions that may present with monoclonal gammopathy include:
  - POEMS syndrome: Polyneuropathy, Organomegaly, Endocrinopathy, Monoclonal protein and Skin Changes – may also have sclerotic bone lesions and Castleman's disease. See: **Multiple Myeloma and Plasmacytomas – Initial Work-up/Staging (ONC-25.2)** for imaging recommendations.

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- Waldenström's Macroglobulinemia: IgM monoclonal protein along with bone marrow infiltration of small lymphocytes. See: **Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma (ONC-27.10)** for imaging recommendations.
- Systemic Light chain Amyloidosis: light chain monoclonal protein in serum or urine with clonal plasma cells in bone marrow, systemic involvement of the kidneys, liver, heart, gastrointestinal tract or peripheral nerves due to amyloid deposition. See: **Multiple Myeloma and Plasmacytomas – Initial Work-up/Staging (ONC-25.2), Multiple Myeloma and Plasmacytomas - Restaging/Recurrence (ONC-25.3)**, and **Multiple Myeloma and Plasmacytomas - Surveillance (ONC-25.4)** for imaging recommendations for systemic light chain amyloidosis. See **Myocardial Tc-99m Pyrophosphate Imaging in Cardiac Amyloidosis (CD-3.8)** for cardiac amyloidosis.

Background and Supporting Information

Multiple myeloma (MM) is a neoplastic disorder characterized by the proliferation of a single clone of plasma cells derived from B cells which grows in the bone marrow and adjacent bone, producing skeletal destruction. End-organ damage is classically defined by CRAB criteria (hypercalcemia, renal insufficiency, anemia, and lytic bone lesions), which distinguish symptomatic multiple myeloma from precursor states. The disease spectrum includes monoclonal gammopathy of undetermined significance (MGUS), smoldering multiple myeloma (SMM), solitary plasmacytoma, and overt symptomatic multiple myeloma, which are differentiated by monoclonal protein levels, bone marrow plasma cell percentage, and the presence or absence of myeloma-defining events (NCCN, 2026).

Diagnosis and monitoring of multiple myeloma rely primarily on laboratory studies, including serum and urine protein electrophoresis, immunofixation, serum free light chains, and other biochemical markers such as beta-2 microglobulin and lactate dehydrogenase. These laboratory parameters are essential for staging, risk stratification, and assessment of treatment response. Imaging plays a complementary role, particularly for detecting bone disease and assessing disease burden, but is not the primary modality for routine monitoring in most patients (NCCN, 2026).

A small subset of patients have nonsecretory myeloma, characterized by the absence of measurable monoclonal protein in serum or urine. In these patients, imaging assumes a greater role in disease evaluation, as laboratory markers are not reliable indicators of disease burden (NCCN, 2026).

Other plasma cell-related disorders, including POEMS syndrome, Waldenström macroglobulinemia, and systemic light chain amyloidosis, may present with monoclonal gammopathy but have distinct clinical features, organ involvement, and imaging considerations. These conditions are managed according to separate disease-specific

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pathways based on their unique biology and patterns of systemic involvement (NCCN, 2026).

Health Equity Considerations

Multiple myeloma (MM) and plasmacytomas demonstrate some of the most pronounced and well-documented health inequities among hematologic malignancies, particularly in the United States. Black individuals experience approximately double the incidence of MM compared with White individuals and are diagnosed at younger ages, yet repeatedly face systemic barriers to timely, high-quality care, including lower rates of novel agent use, delayed treatment initiation, and reduced access to autologous stem cell transplantation (ASCT) (Gasoyan et al., 2024; Mateos et al., 2023). A comprehensive U.S. systematic review found that racial disparities were reported in over three-quarters of studies examining MM treatment patterns, with inequities also strongly associated with insurance type, geographic distance from care centers, and socioeconomic status (Gasoyan et al., 2024). Importantly, evidence from equal-access systems consistently shows that when Black patients receive comparable therapy, survival is equivalent or superior to that of White patients, underscoring that observed outcome disparities largely reflect inequitable access rather than biological differences alone (Gasoyan et al., 2024; Mateos et al., 2023).

Disparities extend across the full continuum of MM care, including diagnostic evaluation, imaging surveillance, treatment selection, and supportive care, all areas directly relevant to oncology imaging guidelines. Low socioeconomic status, inadequate insurance coverage, rural residence, and longer travel distances to specialty centers are associated with reduced access to advanced imaging, delayed staging, lower utilization of ASCT, and less frequent use of guideline-recommended supportive measures (Gasoyan et al., 2024). Globally, similar patterns emerge, with older age, female sex, minority race/ethnicity, and lower socioeconomic status consistently linked to poorer access to treatment and worse outcomes, although the magnitude and drivers of disparity vary by health system (Mateos et al., 2023). Ensuring equitable access to evidence-based imaging, critical for diagnosis, staging, treatment response assessment, and detection of skeletal and extramedullary disease, requires attention to modifiable structural barriers, including insurance design, prior authorization requirements, geographic access to advanced imaging, and inclusion of underrepresented populations in clinical trials. Addressing these factors is essential to achieving equitable outcomes in MM and plasmacytomas and to realizing the full benefits of modern myeloma therapies across all populations (Gasoyan et al., 2024; Mateos et al., 2023).

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Multiple Myeloma and Plasmacytomas – Suspected/Diagnosis (ONC-25.1)

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See: **Initial Work-up/Staging (ONC-25.2)**

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Multiple Myeloma and Plasmacytomas – Initial Work-Up/Staging (ONC-25.2)

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Criteria

Indication	Medically Necessary Imaging Study
Either of the following: • Confirmed myeloma • Myeloma suspected (to include smoldering and MGUS) based on any of the following: ◦ Abnormal skeletal survey or other imaging ◦ Abnormal myeloma labs ◦ Signs/symptoms of multiple myeloma	EITHER of the following: • Whole-body low-dose skeletal CT (CPT® 76497) or • Whole-body FDG PET/CT (CPT® 78816)
Inconclusive findings on whole-body low-dose skeletal CT in individuals with multiple myeloma and plasmacytomas	• PET/CT (CPT® 78815 or CPT® 78816)
To discern smoldering myeloma from active myeloma and whole-body CT or PET are negative or inconclusive	ONE of the following: • MRI Bone Marrow Blood Supply (CPT® 77084) • Whole-body MRI (CPT® 76498) • CT contrast as requested of a specific area to determine radiotherapy or surgical candidacy, or for suspected extra-osseous plasmacytoma
Initial work-up of suspected or known POEMS syndrome or monoclonal gammopathy of neurological significance (MGNS)	• CT Chest with contrast (CPT® 71260) and • CT Abdomen and Pelvis with contrast (CPT® 74177) • Whole-body FDG PET/CT (CPT® 78816) for sclerotic bone lesions on other imaging

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Indication	Medically Necessary Imaging Study
Initial work-up of suspected or known systemic light chain amyloidosis	• Whole-body low-dose skeletal CT (CPT® 76497) OR Whole-body FDG PET/CT (CPT® 78816) • Additional imaging, base on suspected organ involvement: ◦ CT Chest with contrast (CPT® 71260) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) For additional imaging related to cardiac involvement, see: **Cardiac Amyloidosis (CD-3.8)**

Background and Supporting Information

Multiple myeloma (MM) is a clonal plasma cell malignancy defined by proliferation of plasma cells in the bone marrow and the presence of myeloma-defining events, including CRAB criteria or biomarkers such as focal lesions on MRI. The disease exists along a spectrum that includes monoclonal gammopathy of undetermined significance (MGUS), smoldering myeloma (SMM), solitary plasmacytoma, and symptomatic MM, which are differentiated by laboratory findings, bone marrow involvement, and end-organ damage (NCCN, 2026). Imaging plays a central role in initial work-up and staging, particularly for detection of lytic bone lesions and extramedullary disease.

Related plasma cell disorders such as POEMS syndrome, monoclonal gammopathy of neurological significance (MGNS), and systemic light chain amyloidosis may involve systemic organs and demonstrate distinct imaging findings. These conditions often require additional cross-sectional imaging to evaluate organ involvement or atypical skeletal findings beyond lytic lesions (NCCN, 2026).

Evidence Discussion

The recommendation for whole-body low-dose CT or whole-body FDG PET/CT as the initial imaging modality in suspected or confirmed multiple myeloma is supported by NCCN guidance identifying both as preferred for initial diagnostic work-up. These modalities provide sensitive detection of osteolytic lesions, which are a defining feature of symptomatic myeloma and are required for accurate staging. Compared with skeletal survey, whole-body imaging improves lesion detection and allows more accurate assessment of total disease burden, directly impacting diagnosis and treatment decisions (NCCN, 2026).

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The use of PET/CT for inconclusive findings on whole-body low-dose CT is supported by its ability to detect metabolically active disease. NCCN notes that FDG-PET/CT can identify otherwise unrecognized lesions and residual disease and has prognostic importance, as persistent FDG-avid lesions are associated with worse outcomes. This supports PET/CT as a secondary or problem-solving modality when CT findings are indeterminate, rather than a universal replacement for CT (NCCN, 2026).

MRI is supported when CT or PET/CT findings are negative or inconclusive in order to distinguish smoldering myeloma from active myeloma. NCCN specifies that more than one focal lesion on MRI is considered a myeloma-defining biomarker, and MRI is therefore critical in identifying early marrow involvement not visualized on CT. This improves diagnostic accuracy, ensuring appropriate classification of patients and preventing both underdiagnosis of active disease and overtreatment of smoldering disease (NCCN, 2026).

The recommendation for CT chest, abdomen, and pelvis or PET/CT in POEMS syndrome, MGNS, and systemic light chain amyloidosis is supported by the systemic nature of these disorders. NCCN indicates that these conditions frequently involve lymph nodes, visceral organs, or sclerotic bone lesions, necessitating cross-sectional imaging beyond skeletal evaluation. Tailoring imaging to the clinical presentation ensures comprehensive assessment of disease extent while avoiding unnecessary or misdirected imaging, thereby balancing diagnostic benefit with potential harms such as radiation exposure and incidental findings (NCCN, 2026).

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Multiple Myeloma and Plasmacytomas – Restaging/Recurrence (ONC-25.3)

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Criteria

Indication	Medically Necessary Imaging Study
Extra-osseous plasmacytoma response to initial therapy in individuals with multiple myeloma and plasmacytomas	Repeat imaging with ONE of the following, whichever modality was used at initial diagnosis: • Whole-body low-dose skeletal CT scan (CPT® 76497) • Whole-body FDG PET/CT (CPT® 78816) • Whole-body MRI (CPT® 76498) • CT of any previously involved area, contrast as requested • MRI of any previously involved area, contrast as requested
Known spine involvement with new neurological signs/symptoms or worsening pain in individuals with multiple myeloma and plasmacytomas	• MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), Lumbar spine (CPT® 72158) without and with contrast
Treatment response assessment in individuals with multiple myeloma and plasmacytomas: • After completion of primary therapy • Non-secretory multiple myeloma • To determine therapy response with inconclusive labs	Repeat imaging with ONE of the modalities below, whichever was used at initial diagnosis: • Whole-body low-dose skeletal CT scan (CPT® 76497) • Whole-body FDG PET/CT (CPT® 78816)

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Indication	Medically Necessary Imaging Study
CAR-T cell therapy in individuals with multiple myeloma and plasmacytomas	Once before treatment and once 30-60 days after completion of treatment: • PET/CT (CPT® 78815 or CPT® 78816) Once at baseline prior to therapy if required by institutional protocol, and at any time for any new neurological symptoms: • MRI Brain without and with contrast (CPT® 70553)
ANY of the following in individuals with multiple myeloma and plasmacytomas: • Suspected progression or relapse/recurrence • Suspected progression of MGUS or SMM to a more malignant form	ONE of the following (using same modality as used at diagnosis): • Whole-body low-dose skeletal CT (CPT® 76497) • Whole-body FDG PET/CT (CPT® 78816) • Whole-body MRI (CPT® 76498)
ANY of the following in individuals with multiple myeloma and plasmacytomas: • Negative PET will allow change in management from active treatment to maintenance or surveillance. • Inconclusive findings on conventional imaging • Whole-body low-dose skeletal CT (CPT® 76497) is unfeasible and recurrence or progression is suspected	• PET/CT (CPT® 78815 or CPT® 78816)
To discern smoldering myeloma from active myeloma and whole-body CT or PET are negative or inconclusive	ONE of the following: • MRI Bone Marrow Blood Supply (CPT® 77084) • Whole-body MRI (CPT® 76498) • MRI without contrast, or MRI without and with contrast for any previously involved bony area or symptomatic area (including whole spine for spinal symptoms)

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Indication	Medically Necessary Imaging Study
Stem cell transplant recipients	ONE of the following, once before transplant and once within 30-100 days after transplant: Imaging should use same modality as initial diagnosis. • Whole-body low-dose skeletal CT scan (CPT® 76497) • MRI Bone Marrow Blood Supply (CPT® 77084) • Whole-body MRI (CPT® 76498) • PET/CT (CPT® 78815 or CPT® 78816)

Background and Supporting Information

Multiple myeloma (MM) and plasmacytomas are plasma cell disorders characterized by clonal proliferation of plasma cells with potential for skeletal involvement, extramedullary disease, and systemic complications. Disease status following treatment is assessed using a combination of laboratory markers and imaging, with imaging playing a complementary role in select clinical scenarios such as suspected progression, non-secretory disease, or evaluation of treatment response when biochemical parameters are inconclusive (NCCN, 2026). Restaging and recurrence evaluation are guided by clinical context, including symptoms, laboratory findings, and prior imaging results.

Evidence Discussion

The recommendation to repeat imaging using the same modality as used at initial diagnosis for assessment of extra-osseous plasmacytoma response and for suspected progression or recurrence is supported by NCCN guidance emphasizing consistency of imaging techniques. NCCN states that follow-up imaging should preferably use the same modality as baseline to allow accurate longitudinal comparison. This approach improves detection of response or progression by minimizing variability between imaging studies and enhances clinical decision-making (NCCN, 2026).

MRI of the cervical, thoracic, or lumbar spine for new neurologic symptoms or worsening pain in individuals with known spinal involvement is supported by NCCN recommendations that MRI provides superior evaluation of bone marrow and soft tissue structures. MRI is particularly sensitive for detecting spinal cord compression, nerve root involvement, and progression of marrow disease. Its use in symptomatic individuals allows rapid diagnosis of clinically significant complications and facilitates timely intervention, which is critical to prevent permanent neurologic deficits (NCCN, 2026).

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Repeat whole-body imaging (low-dose CT, PET/CT, or MRI) for treatment response assessment, particularly after completion of therapy, in non-secretory myeloma, or when laboratory markers are inconclusive, is supported by NCCN guidance that imaging should be performed "as needed" in follow-up. NCCN highlights that residual focal lesions detected on PET/CT or MRI are associated with adverse prognostic significance, supporting the role of imaging in selected scenarios where laboratory monitoring is insufficient. This ensures appropriate evaluation of disease status while avoiding unnecessary routine imaging in patients adequately monitored with laboratory studies (NCCN, 2026).

The use of PET/CT as a problem-solving modality in cases of inconclusive conventional imaging or when evaluating suspected recurrence is supported by its ability to identify metabolically active disease. NCCN notes that PET/CT can detect lesions not identified on CT and can clarify indeterminate findings, which may directly influence management decisions, including the distinction between active treatment and surveillance. Similarly, MRI is supported for distinguishing smoldering myeloma from active disease when CT or PET/CT findings are negative or inconclusive, as MRI can detect focal marrow lesions that represent myeloma-defining events (NCCN, 2026).

Finally, imaging before and after major treatment interventions such as stem cell transplant or CAR-T cell therapy is supported to establish baseline disease burden and assess response. NCCN indicates that imaging findings contribute to evaluation of treatment effectiveness and may have prognostic implications. The selective use of imaging in these scenarios balances the benefits of accurate disease assessment with the risks of overuse, including radiation exposure, cost, and incidental findings (NCCN, 2026).

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Multiple Myeloma and Plasmacytomas – Surveillance (ONC-25.4)

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Criteria

Indication	Medically Necessary Imaging Study
• Smoldering myeloma • Multiple myeloma	ANY ONE of the following (using same imaging modality used at diagnosis) annually: • Whole-body low-dose skeletal CT (CPT® 76497) • MRI Bone Marrow Blood Supply (CPT® 77084) • Whole-body MRI (CPT® 76498) • Whole-body FDG PET/CT (CPT® 78816)
Solitary plasmacytomas	Any ONE of the following (using same imaging modality used at diagnosis) annually for 5 years: • Whole-body low-dose skeletal CT (CPT® 76497) • MRI Bone Marrow Blood Supply (CPT® 77084) • Whole-body MRI (CPT® 76498) • Whole-body FDG PET/CT (CPT® 78816)
Individuals with MGUS	No further advanced imaging is considered medically necessary beyond baseline unless there are signs and symptoms of progression

Background and Supporting Information

Multiple myeloma (MM) is a plasma cell malignancy characterized by clonal proliferation within the bone marrow and progressive skeletal involvement, which represents a key feature of disease burden and progression. Imaging is central to the evaluation of bone disease, as lytic lesions and bone marrow infiltration are major components of disease activity and are required for diagnosis and treatment decision-making (Perillo et al., 2024; NCCN, 2026).

Imaging also plays an important role in longitudinal disease monitoring, particularly for identifying progression, detecting new lesions, and evaluating treatment response. Given the chronic nature of MM and the potential for progression from smoldering disease or solitary plasmacytoma, periodic imaging using consistent modalities is

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important to assess disease stability and guide management (Perillo et al., 2024; NCCN, 2026).

Evidence Discussion

The recommendation for annual surveillance imaging using the same modality as at diagnosis in smoldering myeloma and multiple myeloma is supported by evidence that bone disease is a predominant and progressive feature of MM, occurring in the majority of patients over time. Imaging is essential for detecting lytic lesions, which represent end-organ damage and may prompt treatment initiation or modification. Cross-sectional imaging modalities such as CT, PET/CT, and MRI are more sensitive than radiography for detecting skeletal lesions, enabling earlier identification of disease progression and clinically meaningful changes (Perillo et al., 2024; Dimopoulos et al., 2015).

Whole-body low-dose CT is supported as an effective surveillance modality due to its ability to detect osteolytic lesions throughout the skeleton with high accuracy and relatively low radiation dose. Compared with conventional skeletal survey, WBLDCT demonstrates increased sensitivity for bone disease and can identify lesions that may alter disease management or prevent skeletal-related complications. Its speed, accessibility, and cost-effectiveness further support its role in longitudinal surveillance (Terao & Matsue, 2022; Perillo et al., 2024).

FDG PET/CT is supported for its ability to detect metabolically active disease and identify extramedullary involvement, which is associated with poorer prognosis. PET/CT provides both functional and anatomical information and is more sensitive than CT alone for detecting extramedullary disease. Additionally, PET/CT plays a role in distinguishing between smoldering and active myeloma and may identify early progression, supporting its inclusion as an appropriate surveillance option when used consistently with baseline imaging (Cavo et al., 2017; Perillo et al., 2024).

MRI, including whole-body MRI and diffusion-weighted MRI, is supported as the most sensitive modality for detecting bone marrow infiltration, including lesions not yet associated with cortical destruction. MRI can identify early disease progression and has prognostic value, as patterns of marrow involvement and ADC measurements correlate with disease severity and outcomes. Advanced MRI techniques, including diffusion-weighted imaging and synthetic MRI parameters, enable assessment of treatment response and disease burden at a cellular level, making MRI particularly valuable for surveillance and risk stratification (Costachescu et al., 2021; Cui et al., 2024; Perillo et al., 2024).

For solitary plasmacytomas, the recommendation for annual imaging for 5 years is supported by the risk of progression to multiple myeloma and the need for ongoing assessment of both local disease control and development of systemic involvement. Using the same imaging modality as at diagnosis allows accurate comparison over time and improves detection of new lesions or progression. Across all surveillance strategies,

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limiting imaging frequency to annual intervals balances the benefit of early detection of progression with the potential harms of repeated imaging, including radiation exposure (for CT and PET/CT), cost, and false-positive findings, while still ensuring appropriate monitoring of disease status (Perillo et al., 2024; NCCN, 2026).

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Leukemias, Myelodysplasia and Myeloproliferative Neoplasms (ONC-26)

Guideline

Leukemias, Myelodysplasia, and Myeloproliferative Neoplasms – General Considerations (ONC-26.1)
Acute Leukemias (ONC-26.2)
Chronic Myeloid Leukemias, Myelodysplastic Syndrome, and Myeloproliferative Disorders (ONC-26.3)
Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL) (ONC-26.4)
References (ONC-26)

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Leukemias, Myelodysplasia, and Myeloproliferative Neoplasms – General Considerations (ONC-26.1)

ON.LM.0026.1.A
v1.0.2027

Criteria

- Routine advanced imaging is not considered medically necessary for the evaluation and management of hairy cell leukemia in the absence of specific localizing clinical symptoms.

Background and Supporting Information

Hairy cell leukemia (HCL) is a rare, indolent B-cell lymphoid malignancy characterized by infiltration of the bone marrow and spleen, frequently presenting with pancytopenia, splenomegaly, and minimal lymphadenopathy. It accounts for approximately 2% of all leukemias and demonstrates a chronic clinical course with long survival, often managed with intermittent therapy or observation depending on symptom burden (NCCN, 2026; PDQ Adult Treatment Editorial Board, 2025).

Diagnosis and management of HCL rely primarily on hematologic evaluation, including peripheral blood smear, bone marrow biopsy, immunophenotyping, and molecular testing such as detection of the BRAF V600E mutation. Clinical assessment and laboratory studies are central to disease evaluation, while imaging is considered optional and typically reserved for selected clinical circumstances (NCCN, 2026; PDQ Adult Treatment Editorial Board, 2025).

The clinical course of HCL is often indolent, and many patients can be managed with a "watchful waiting" approach until symptomatic disease or cytopenias develop. Treatment decisions are driven by clinical findings such as progressive cytopenias, splenomegaly, recurrent infections, or systemic symptoms rather than imaging findings (Troussard et al., 2024; NCCN, 2026).

Evidence Discussion

The recommendation that routine advanced imaging is not medically necessary for the evaluation and management of hairy cell leukemia in the absence of specific localizing clinical symptoms is supported by NCCN and PDQ guidance emphasizing that diagnosis and disease monitoring are primarily based on clinical and laboratory parameters. Key diagnostic tools include peripheral blood evaluation, bone marrow

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biopsy, immunophenotyping, and molecular testing, rather than imaging (NCCN, 2026; PDQ Adult Treatment Editorial Board, 2025).

The limited role of imaging also reflects the typical disease distribution in HCL, which preferentially involves the bone marrow and spleen and rarely presents with significant lymphadenopathy. Because disease burden is most accurately assessed through hematologic parameters and bone marrow evaluation, routine advanced imaging provides limited incremental diagnostic value. Imaging may be used selectively in atypical presentations or complex cases, but its routine use is not supported by evidence (PDQ Adult Treatment Editorial Board, 2025; Troussard et al., 2024).

Avoidance of routine advanced imaging minimizes potential harms, including radiation exposure, false-positive findings, unnecessary downstream testing, and increased healthcare costs. By reserving imaging for patients with specific localizing symptoms or unusual clinical findings, the recommended approach aligns with evidence-based, risk-adapted care while maintaining diagnostic accuracy and patient safety (NCCN, 2026; PDQ Adult Treatment Editorial Board, 2025; Troussard et al., 2024).

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Acute Leukemias (ONC-26.2)

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Criteria

- Imaging indications for acute lymphoblastic leukemia in adult individuals are identical to those for pediatric individuals. See: **Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Imaging indications for acute myeloid leukemia in adult individuals are identical to those for pediatric individuals. See: **Acute Myeloid Leukemia (AML) (PEDONC-3.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Background and Supporting Information

Acute leukemias, including acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML), are aggressive hematologic malignancies characterized by clonal proliferation of immature blast cells in the bone marrow, blood, and extramedullary sites. Diagnosis relies on hematopathologic evaluation, including bone marrow biopsy, immunophenotyping, cytogenetic analysis, and molecular testing, which together inform classification, risk stratification, and treatment planning (NCCN, 2026).

Health Equity Considerations

Equitable care for acute leukemias, including acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL), is influenced not only by disease biology but also by a complex interplay of sociodemographic and health system factors. Although treatment paradigms emphasize cytogenetics, molecular risk, and patient fitness, substantial evidence demonstrates that race, ethnicity, and socioeconomic status independently impact survival and access to care (Hibbs, 2021). Minority populations, including Black and Hispanic patients, often experience poorer outcomes despite similar or even favorable biologic risk profiles, and are frequently diagnosed at younger ages yet have worse survival, suggesting the influence of structural inequities rather than biology alone (Bencomo-Alvarez et al., 2021; Dong et al., 2024; Hibbs, 2021). Socioeconomic disadvantage, including lower income, limited insurance coverage, and reduced access to specialized centers, has been consistently associated with inferior outcomes and reduced likelihood of receiving intensive or potentially curative therapies such as hematopoietic stem cell transplantation (Dong et al., 2024; Hibbs, 2021). Additional barriers, including language proficiency, health literacy, and immigration status, may delay diagnosis, disrupt treatment continuity, and limit engagement in complex care pathways (Bencomo-Alvarez et al., 2021; Hibbs, 2021).

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Disparities are further reinforced by inequities in access to clinical trials and emerging therapies. Analyses of U.S. acute leukemia trials demonstrate that non-Hispanic White patients are disproportionately enrolled compared with Black, Hispanic, Asian, and Native American populations, even after adjusting for disease incidence (Hantel et al., 2021). This underrepresentation limits the generalizability of trial results and restricts equitable access to novel therapies at the forefront of leukemia care (Hantel et al., 2021). Structural and logistical barriers, such as rapid treatment timelines, inpatient treatment settings, and unequal access to tertiary centers, can further hinder trial participation among underserved populations (Hantel et al., 2021). At the patient level, social determinants including housing instability, transportation challenges, comorbidities, and environmental exposures contribute to higher treatment-related morbidity and reduced survival (Bencomo-Alvarez et al., 2021; Hibbs, 2021). Recognition of these multilevel disparities, including differences in treatment access, trial participation, and social support, is essential when considering imaging, staging, and longitudinal management strategies for patients with acute leukemias to ensure equitable care delivery and outcomes across diverse populations.

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Chronic Myeloid Leukemias, Myelodysplastic Syndrome, and Myeloproliferative Disorders (ONC-26.3)

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Criteria

- Routine advanced imaging is not considered medically necessary in the evaluation and management of chronic myeloid leukemias, myelodysplastic syndromes or myeloproliferative disorders in the absence of specific localizing clinical symptoms or clearance for hematopoietic stem cell transplantation.
- See: **Hematopoietic Stem Cell Transplantation (ONC-29)** for imaging guidelines related to transplant.
- For work-up of elevated blood counts, see: **Paraneoplastic Syndromes – General Considerations (ONC-30.3)**.

Background and Supporting Information

Chronic myeloid leukemias, myelodysplastic syndromes (MDS), and myeloproliferative neoplasms (MPN) are hematologic malignancies characterized by clonal proliferation of myeloid lineage cells with variable degrees of marrow dysfunction, cytopenias, or cytoses. Diagnosis and classification rely on integration of clinical findings, peripheral blood evaluation, bone marrow morphology, cytogenetic abnormalities, and molecular testing (NCCN, 2026).

Initial evaluation and monitoring of these disorders are primarily laboratory-based, including complete blood counts, bone marrow biopsy, and molecular profiling (e.g., JAK2, CALR, MPL mutations in MPN and gene mutation panels in MDS). Physical examination findings such as splenomegaly and symptom burden are also important in disease assessment. Imaging is not routinely required for diagnosis but may be used selectively to evaluate organ involvement or complications when clinically indicated (NCCN, 2026).

Myeloproliferative neoplasms and related myeloid disorders may demonstrate risk stratification based on clinical and molecular features, including prognostic scoring systems such as DIPSS, MIPSS, and IPSS-R. These risk models guide therapeutic decisions and follow-up strategies, further emphasizing that disease monitoring is driven primarily by clinical and laboratory parameters rather than routine imaging (NCCN, 2026).

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Evidence Discussion

The recommendation that routine advanced imaging is not medically necessary in the evaluation and management of chronic myeloid leukemias, myelodysplastic syndromes, and myeloproliferative disorders is supported by NCCN guidance indicating that diagnosis, staging, and monitoring are primarily based on hematologic, cytogenetic, and molecular assessments. For MDS and MPN, evaluation centers on complete blood counts, bone marrow aspiration and biopsy, and molecular testing to establish clonality and risk stratification, with imaging not included as a standard component of routine work-up (NCCN, 2026).

The limited role of imaging is further supported by the availability of highly sensitive laboratory and molecular techniques, including next-generation sequencing and cytogenetics, which provide detailed information on disease burden, clonality, and progression risk. These modalities allow clinicians to monitor disease course and response to therapy with greater precision than imaging, reducing the need for routine cross-sectional imaging and reinforcing a laboratory-based monitoring paradigm (NCCN, 2026).

Health Equity Considerations

Chronic myeloid leukemia (CML), myelodysplastic syndromes (MDS), and myeloproliferative disorders (MPD) demonstrate substantial inequities in incidence, stage at diagnosis, and outcomes across geographic, socioeconomic, and demographic groups. Global Burden of Disease analyses show that while higher–socio-demographic index (SDI) countries bear the greatest absolute disease burden, largely due to aging populations and improved diagnostic capacity, patients in low- and low-middle SDI regions experience disproportionately higher mortality-to-incidence ratios, reflecting delayed diagnosis, limited access to specialized hematopathology services, and restricted availability of disease-modifying therapies (Passera, 2025; Gou et al., 2025). Older adults, particularly in rural or resource-limited settings, face additional barriers related to comorbidities, limited health literacy, transportation challenges, and reduced access to longitudinal monitoring, all of which can delay appropriate imaging evaluation and treatment initiation (Obeagu & Parray, 2026). In the United States, persistent geographic and rural–urban disparities in myeloid leukemia mortality further highlight inequitable access to specialized oncology care, with higher mortality rates observed in rural and Midwestern populations (Lehn et al., 2025).

Racial and sociodemographic disparities also influence disease classification, surveillance, and outcomes in MDS and related disorders. Population-based analyses demonstrate differences in disease subtypes, diagnostic coding, and survival by race, suggesting possible underdiagnosis, misclassification, or biologic and structural contributors to inequity (Lesegretain et al., 2023). Additionally, differences in access to molecular testing, critical for diagnosis and risk stratification, may result in less frequent

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or delayed use of guideline-concordant imaging and monitoring among underserved populations. Ensuring equitable application of imaging guidelines requires awareness of these disparities, incorporation of risk-based evaluation strategies, and flexibility in imaging pathways for patients facing access barriers. Addressing health equity in these disorders necessitates improved access to hematologic expertise, diagnostic infrastructure, and supportive care, alongside efforts to standardize high-quality evaluation across diverse clinical settings (Passera, 2025; Gou et al., 2025; Obeagu & Parray, 2026).

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Chronic Lymphocytic Leukemia (CLL)/ Small Lymphocytic Lymphoma (SLL) (ONC-26.4)

ON.LM.0026.4.A
v1.0.2027

Criteria

- PET imaging is not considered medically necessary in the evaluation of CLL/SLL with the exception of suspected Richter's transformation (see suspected transformation, below).
- CLL/SLL is monitored with serial laboratory studies. Routine advanced imaging is not considered medically necessary for monitoring treatment response or surveillance, except when initial studies reveal bulky disease involvement.
- Bulky disease is defined as lymph node mass greater than 10cm or spleen greater than 6cm below costal margin.

Indication	Medically Necessary Imaging Study
Initial Staging/Diagnosis of CLL/SLL	• Routine advanced imaging is not considered medically necessary for initial evaluation of asymptomatic individuals
For ANY of the following in individuals with CLL/SLL: • Bulky lymph node mass (>10cm) • Splenomegaly >6cm below costal margin • Presence of B symptoms • Progressive anemia and thrombocytopenia • Prior to planned systemic therapy	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
Treatment Response in individuals with CLL/SLL	• For individuals with bulky nodal disease at diagnosis, CT with contrast of previously involved area(s) every 2 cycles of therapy • Routine imaging is not considered medically necessary for individuals without bulky nodal disease at diagnosis
End of Therapy Evaluation in individuals with CLL/SLL	• For individuals with bulky nodal disease at diagnosis, CT with contrast of previously involved area(s)
Suspected Progression in individuals with CLL/SLL	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)
Suspected transformation (Richter's) from a low-grade lymphoma to a more aggressive type based on one or more of the following: • New B symptoms • Rapidly growing lymph nodes • Extranodal disease develops • Significant recent rise in LDH above normal range	• PET/CT (CPT® 78815 or CPT® 78816)
Surveillance in individuals with CLL/SLL	For individuals with bulky nodal disease at diagnosis, every 6 months for two years, then annually: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) Routine imaging is not considered medically necessary for individuals without bulky nodal disease at diagnosis

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Background and Supporting Information

Chronic lymphocytic leukemia (CLL) and small lymphocytic leukemia (SLL) are indolent B-cell lymphoproliferative disorders characterized by clonal expansion of mature lymphocytes in the peripheral blood, bone marrow, and lymphoid tissues. Diagnosis is established by peripheral blood flow cytometry demonstrating a characteristic immunophenotype, with SLL requiring tissue biopsy for confirmation. Staging and risk stratification are based on clinical and laboratory parameters, including cytopenias, lymphocyte count, and molecular features such as cytogenetics and TP53 mutation status (NCCN, 2026).

Evaluation and monitoring of CLL/SLL are primarily laboratory-based, relying on serial complete blood counts, metabolic panels, and molecular testing. Clinical examination, including assessment of lymphadenopathy and splenomegaly, is central to disease monitoring. Routine imaging is not required for diagnosis or surveillance in asymptomatic individuals and is reserved for selected clinical scenarios such as bulky disease, symptoms, or treatment planning (NCCN, 2026).

Evidence Discussion

The recommendation that PET imaging is not medically necessary in the evaluation of CLL/SLL, except in suspected Richter transformation, is supported by NCCN guidance indicating that PET/CT has limited utility in routine CLL management due to the typically low metabolic activity of indolent disease. PET/CT is specifically recommended when transformation to aggressive lymphoma is suspected, as increased FDG uptake can identify high-grade disease and guide biopsy of the most metabolically active lesion, improving diagnostic accuracy (NCCN, 2026).

The guidance that CLL/SLL is monitored with serial laboratory studies and that routine advanced imaging is not medically necessary for treatment response or surveillance is supported by the central role of laboratory and clinical parameters in disease monitoring. NCCN emphasizes that complete blood counts, biochemical markers, and clinical examination provide sufficient information for assessing disease status and progression in most patients. Routine imaging does not improve clinical outcomes in asymptomatic individuals and may lead to unnecessary radiation exposure and incidental findings (NCCN, 2026).

The selective use of CT imaging in individuals with bulky disease, symptoms, or prior to systemic therapy is supported by NCCN recommendations that CT can be useful to assess extent of lymphadenopathy and organ involvement, particularly when there is concern for tumor lysis syndrome or mass effect. Bulky disease (e.g., large lymph node masses or significant splenomegaly) may influence treatment planning and risk stratification, justifying targeted imaging in these situations while avoiding routine use in lower-risk patients (NCCN, 2026).

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The recommendation for imaging in suspected progression or recurrence, as well as for suspected Richter transformation, reflects the need for targeted diagnostic evaluation when clinical changes occur. PET/CT is particularly valuable in suspected transformation, where higher FDG uptake correlates with aggressive histology and guides biopsy, while CT is appropriate for assessment of disease burden and progression. Restricting imaging to these clinically indicated scenarios balances the benefit of identifying clinically significant disease changes with the risks of over-imaging, including radiation exposure, cost, and downstream diagnostic interventions (NCCN, 2026).

Health Equity Considerations

Chronic lymphocytic leukemia (CLL)/small lymphocytic lymphoma (SLL) demonstrates persistent health inequities across racial, socioeconomic, and geographic groups, despite substantial improvements in survival following the introduction of targeted therapies. Population-based analyses using Surveillance, Epidemiology, and End Results (SEER) data consistently show that Black patients and those residing in lower neighborhood socioeconomic strata experience inferior overall survival compared with White patients, even in the post-2014 era when Bruton tyrosine kinase (BTK) and BCL2 inhibitors are widely available (Kittai et al., 2022). These disparities are closely linked to structural factors, including delayed access to specialty oncology care, underutilization of academic treatment centers, and financial barriers to high-cost oral therapies. Real-world cohort data suggest that when access to hematologic care and modern small-molecule inhibitors is comparable, racial differences in overall survival are substantially attenuated, underscoring access to care rather than race as a primary driver of outcome inequities (Kittai et al., 2024). Variations in disease presentation, including higher-risk prognostic features at diagnosis and shorter time to treatment initiation among Black patients, further highlight the need for equitable diagnostic evaluation and longitudinal disease monitoring.

Equity considerations in CLL/SLL extend beyond survival outcomes to include patient-reported quality-of-life (QoL), which is increasingly recognized as a key dimension of care in a disease frequently managed with prolonged active surveillance. Sex-specific disparities in QoL have been documented, with women experiencing significantly worse social, emotional, and overall well-being during surveillance compared with men, while reporting improved QoL once structured treatment and regular clinical engagement are initiated (Mahameed et al., 2025). These findings suggest that reduced clinical contact inherent to surveillance strategies may disproportionately affect certain patient populations, particularly women, through unmet psychosocial and supportive care needs. For imaging guidelines, awareness of these inequities is important to support individualized, guideline-concordant evaluation that accounts for differences in access, symptom burden, and supportive care infrastructure. Incorporating health equity considerations into imaging pathways may help mitigate

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disparities in disease assessment and ensure consistent monitoring across diverse patient populations (Kittai et al., 2022; Kittai et al., 2024; Mahameed et al., 2025).

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Non-Hodgkin Lymphomas (ONC-27)

Guideline

Non-Hodgkin Lymphomas – General Considerations (ONC-27.1)
Diffuse Large B Cell Lymphoma (DLBCL) (ONC-27.2)
Follicular Lymphoma (ONC-27.3)
Marginal Zone Lymphomas (ONC-27.4)
Mantle Cell Lymphoma (ONC-27.5)
Burkitt's Lymphomas (ONC-27.6)
Lymphoblastic Lymphomas (ONC-27.7)
T Cell Lymphomas (ONC-27.8)
Post-Transplant Lymphoproliferative Disorders (ONC-27.9)
Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma (ONC-27.10)
References (ONC-27)

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Non-Hodgkin Lymphomas – General Considerations (ONC-27.1)

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Criteria

- Individuals with AIDS-related lymphoma should be imaged according to the primary lymphoma histology.
- See: **Castleman's Disease (unicentric and multicentric) (ONC-31.11)** for guidelines covering Castleman's disease.
- See: **Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL) (ONC-26.4)** for guidelines covering Chronic Lymphocytic Leukemia (CLL)/ Small Lymphocytic Lymphoma (SLL).

Indication	Medically Necessary Imaging Study
• Biopsy proven lymphoma, or • Suspected lymphoma and any of the following: ◦ Bulky lymphadenopathy (LN mass >10cm) ◦ Hepatomegaly ◦ Splenomegaly ◦ B symptom: Unexplained fever, drenching night sweats, unintended weight loss >10% total body weight	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast ◦ MRI without and with contrast for individuals who cannot tolerate CT contrast due to allergy or impaired renal function
Signs or symptoms of non-Hodgkin lymphomas involving the neck	• CT Neck with contrast (CPT® 70491)
Signs or symptoms suggesting CNS involvement with lymphoma	• MRI Brain without and with contrast (CPT® 70553) • See: **CNS Lymphoma (also known as Microglioma) (ONC-2.7)**

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Indication	Medically Necessary Imaging Study
Known or suspected bone involvement with lymphoma	• MRI without and with contrast of symptomatic or previously involved bony areas ◦ Bone scan is inferior to MRI for evaluation of known or suspected bone involvement with lymphoma
Determine a more favorable site for biopsy when a relatively inaccessible site is contemplated in individuals with non-Hodgkin lymphomas	• PET/CT (CPT® 78815 or CPT® 78816) ◦ PET/CT is not considered medically necessary for all other indications prior to histological confirmation of lymphoma
CAR-T cell therapy in individuals with non-Hodgkin lymphomas	Once before treatment and once 30-60 days after completion of treatment: • PET/CT (CPT® 78815 and CPT® 78816) Once at baseline prior to therapy if required by institutional protocol, and at any time for any new neurological symptoms: • MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Non-Hodgkin lymphomas (NHL) represent a heterogeneous group of lymphoid malignancies with variable clinical behavior ranging from indolent to aggressive disease. Clinical presentation frequently includes lymphadenopathy, splenomegaly, hepatomegaly, or systemic "B symptoms" such as fever, night sweats, and weight loss. Diagnosis requires histopathologic confirmation through biopsy, with immunophenotyping and molecular studies used to determine subtype and guide management (NCCN, 2026).

Evidence Discussion

The recommendation to perform CT chest, abdomen, and pelvis with contrast in individuals with biopsy-proven lymphoma or suspected lymphoma with bulky lymphadenopathy, hepatomegaly, splenomegaly, or B symptoms is supported by NCCN guidance indicating that cross-sectional imaging is essential for staging and evaluation of disease extent when there is clinical concern for systemic involvement. CT imaging

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provides anatomic assessment of nodal and extranodal disease, which is critical for staging, treatment planning, and risk stratification (NCCN, 2026).

The selective use of additional imaging based on symptoms, such as CT neck for cervical involvement and MRI brain for suspected central nervous system involvement, is consistent with NCCN recommendations that imaging should be directed by clinical presentation. These targeted imaging approaches improve diagnostic yield by focusing on areas of suspected disease while avoiding unnecessary imaging in asymptomatic regions (NCCN, 2026).

MRI for evaluation of suspected bone involvement is supported by NCCN guidance indicating that MRI provides superior sensitivity for detecting marrow infiltration compared with other imaging modalities. In cutaneous and other lymphomas, imaging for bone involvement is performed when clinically indicated rather than routinely, reinforcing a symptom-directed approach to imaging utilization (NCCN, 2026).

The recommendation that PET/CT is not routinely required prior to histologic confirmation but may be used to guide biopsy in cases where a more accessible or metabolically active site is needed is supported by NCCN guidance that FDG-PET/CT is most appropriately used after diagnosis or in selected pre-diagnostic scenarios. PET/CT can identify sites of higher metabolic activity, improving the likelihood of diagnostic yield when biopsying difficult-to-access lesions; however, routine use prior to diagnosis is not supported due to lack of specificity and potential for false-positive findings. Finally, the use of PET/CT in the context of CAR-T therapy is supported by NCCN guidance that imaging before and after therapy is necessary to establish baseline disease burden and assess response. Across all scenarios, the criteria emphasize a risk-adapted and symptom-directed approach to imaging that balances the benefits of accurate staging and disease assessment with the potential harms of unnecessary imaging, including radiation exposure, incidental findings, and increased healthcare utilization (NCCN, 2026).

Health Equity Considerations

Non-Hodgkin lymphomas (NHLs) exhibit substantial and persistent disparities in incidence, mortality, and survival that are closely linked to race, socioeconomic status, sex, and geography. In the United States, population-based analyses demonstrate that Black patients with NHL experience significantly worse survival compared with non-Hispanic White patients, even after adjustment for stage, treatment modality, age, and sex, highlighting inequities that extend beyond disease biology alone (Abodunrin et al., 2022). Insurance status is a critical modifier of outcomes, with publicly insured and uninsured individuals experiencing markedly higher mortality across racial and ethnic groups, reflecting barriers to timely diagnosis, access to subspecialty care, and receipt of guideline-concordant therapy (Abodunrin et al., 2022). National mortality trends further show higher age-adjusted NHL-related death rates among men, residents of

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nonmetropolitan areas, and individuals living in specific geographic regions, particularly parts of the Midwest, underscoring the role of structural, regional, and healthcare access factors in shaping outcomes (Saad et al., 2025).

From a global perspective, inequities in NHL burden are strongly associated with socioeconomic development and healthcare infrastructure. High–socio-demographic index (SDI) regions demonstrate higher incidence and prevalence, likely reflecting improved diagnostic capacity and imaging availability, while low-SDI regions bear a disproportionate share of mortality and disability-adjusted life years due to delayed diagnosis, limited access to advanced imaging, and constrained treatment options (Wang et al., 2025). These global patterns emphasize that disparities in NHL outcomes are driven both by underdiagnosis in resource-limited settings and by unequal access to timely staging, response assessment, and surveillance imaging worldwide. These findings reinforce the importance of promoting equitable access to appropriate imaging modalities across diverse populations and care settings. Consistent application of evidence-based imaging can help reduce delays in diagnosis and staging, support more accurate risk stratification, and mitigate downstream inequities in treatment and survival for patients with NHL (Abodunrin et al., 2022; Saad et al., 2025; Wang et al., 2025).

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Diffuse Large B Cell Lymphoma (DLBCL) (ONC-27.2)

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Criteria

- Grey zone lymphomas, primary mediastinal B cell lymphomas, Grade 3 (high) follicular lymphoma, double-hit or triple-hit lymphomas, and primary cutaneous diffuse large B cell lymphoma should also be imaged according to these guidelines.

Indication	Medically Necessary Imaging Study
Initial staging/ diagnosis of diffuse large B Cell lymphoma	ONE of the following:* • PET/CT (CPT® 78815 or CPT® 78816) OR • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) *PET/CT and diagnostic CT are not considered medically necessary concurrently; however, if CT was performed prior to diagnosis, a PET/CT may be subsequently medically necessary.
Treatment response for all stage I, and stage II diffuse large B cell lymphoma without extensive mesenteric disease	ANY of the following: • CT with contrast of previously involved area(s) may be approved every 2 cycles (6-8 weeks) of therapy • PET/CT (CPT® 78815 or CPT® 78816) after 3-4 cycles of chemotherapy
Treatment response for stage II diffuse large B cell lymphoma WITH extensive mesenteric disease, and stages III-IV	ANY of the following: • CT with contrast of previously involved area(s) may be approved every 2 cycles (6-8 weeks) of therapy • PET/CT (CPT® 78815 or CPT® 78816) after 2-4 cycles of chemotherapy

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Indication	Medically Necessary Imaging Study
End of Chemotherapy and/or Radiation Therapy Evaluation in individuals with diffuse large B cell lymphoma	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) at the end of chemotherapy and again at the end of radiation • CT with contrast of previously involved area(s)
Suspected Recurrence in individuals with diffuse large B cell lymphoma	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) • PET/CT can be considered in rare circumstances (e.g., bone involvement).
Biopsy-proven recurrence in individuals with diffuse large B cell lymphoma	• PET/CT (CPT® 78815 or CPT® 78816)
CAR-T cell therapy in individuals with diffuse large B cell lymphoma	Once before treatment and once 30-60 days after completion of treatment: • PET/CT (CPT® 78815 or CPT® 78816) Once at baseline prior to therapy if required by institutional protocol, and at any time for any new neurological symptoms: • MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Surveillance in individuals with diffuse large B cell lymphoma for ANY of the following: • All stages of DLBCL • Relapsed lymphoma • Primary mediastinal large B cell lymphoma • Primary cutaneous diffuse large B cell lymphoma	• Every 6 months for 2 years after completion of treatment: ◦ CT Chest with contrast (CPT® 71260) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ CT with contrast of previously involved area(s)

Background and Supporting Information

Diffuse large B-cell lymphoma (DLBCL) is an aggressive, FDG-avid non-Hodgkin lymphoma characterized by rapidly proliferating malignant B cells with nodal and extranodal involvement. Diagnosis requires histopathologic confirmation, and staging incorporates clinical features and imaging-defined disease distribution using systems such as the Ann Arbor classification (Cheson et al., 2014; NCCN, 2026).

Evidence Discussion

The recommendation to use either PET/CT or contrast-enhanced CT for initial staging reflects evidence that the majority of DLBCL cases are FDG-avid and that both modalities provide clinically meaningful staging information. PET/CT improves detection of nodal and extranodal disease and establishes a metabolic baseline for subsequent response assessment, while CT remains acceptable when PET/CT is unavailable or previously performed. Importantly, PET/CT has not been consistently shown to be more accurate than CT for initial staging alone but provides added value by improving downstream response evaluation and prognostic assessment (Cheson et al., 2014; Barrington et al., 2016).

The use of CT every 2 cycles of therapy and PET/CT at defined intervals during treatment aligns with evidence demonstrating the complementary roles of anatomic and metabolic imaging. Interim PET/CT provides early assessment of treatment response and correlates with outcomes, while CT allows serial measurement of disease burden. PET/CT is particularly valuable at the end of therapy, where it demonstrates greater

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accuracy than CT in distinguishing residual active disease from post-treatment changes, supporting its role as the standard modality for remission assessment (Cheson et al., 2014).

For suspected recurrence, CT is supported for evaluation of disease burden, while PET/CT is reserved for select circumstances such as suspected bone involvement or biopsy-proven relapse. PET/CT improves detection of metabolically active disease and may guide biopsy site selection by identifying areas of highest activity. This targeted use balances diagnostic yield with the higher radiation exposure and cost associated with PET/CT compared with CT alone (Cheson et al., 2014).

The recommendation for PET/CT before and after CAR-T therapy is supported by the prognostic value of FDG avidity. Imaging establishes baseline disease burden and evaluates treatment response, which may guide subsequent therapeutic decisions in relapsed or refractory disease. FDG uptake has been associated with outcomes and may help identify candidates for additional salvage therapies (Cheson et al., 2014; El-Galaly et al., 2015).

Surveillance recommendations limiting imaging to CT every 6 months for 2 years reflect evidence that most relapses occur within this period, while also acknowledging the lack of demonstrated survival benefit from routine surveillance imaging. Multiple studies have shown that routine CT or PET/CT surveillance detects only a minority of relapses and does not improve overall survival compared with clinical follow-up. Relapses are most frequently identified through symptoms, physical examination, or laboratory abnormalities (El-Galaly et al., 2015; Mascaró-Pol et al., 2021). The harms of routine surveillance imaging include radiation exposure, false-positive findings, unnecessary biopsies, increased healthcare costs, and patient anxiety. PET/CT has false-positive rates exceeding 20% in some studies, and CT-based surveillance exposes patients to cumulative radiation doses associated with potential long-term malignancy risk. Additionally, observational data demonstrate no improvement in survival with imaging-based follow-up strategies, supporting a more selective approach focused on clinically indicated imaging (Lynch et al., 2014; Mascaró-Pol et al., 2021).

Health Equity Considerations

Diffuse large B-cell lymphoma (DLBCL) is associated with persistent and clinically meaningful survival disparities related to race, socioeconomic status, and comorbid conditions, despite advances in immunochemotherapy. In U.S.-based community and population studies, Black/African American patients with DLBCL experience significantly worse overall survival compared with non-Black patients, even in the rituximab era and after adjusting for standard prognostic indices such as the Revised International Prognostic Index (R-IPI) (Tiu et al., 2021). These disparities are multifactorial and reflect higher burdens of adverse clinical features at presentation, including elevated lactate dehydrogenase, increased B symptoms, higher prevalence of HIV infection, malnutrition,

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and delayed receipt or non-receipt of curative-intent therapy. Insurance status and access to timely oncology care further contribute, with publicly insured or uninsured patients demonstrating worse outcomes than those with private insurance, underscoring the role of structural and socioeconomic barriers rather than disease biology alone (Tiu et al., 2021).

Globally, health inequities in DLBCL are even more pronounced in low- and middle-income countries, where limited diagnostic infrastructure, delayed treatment initiation, and constrained access to rituximab and supportive care result in markedly inferior survival. In resource-limited settings, five-year overall survival remains low, with advanced stage at diagnosis, elevated LDH, treatment delays, and HIV co-infection independently associated with increased mortality (Kassaw et al., 2026). HIV-positive patients, in particular, experience substantially worse outcomes due to compounded immunosuppression, higher rates of treatment toxicity, and gaps in integrated HIV–oncology care. For imaging guideline development, these inequities highlight the importance of supporting equitable access to accurate staging, response assessment, and surveillance imaging, especially for populations at risk for delayed diagnosis or fragmented care. Ensuring consistent, guideline-concordant imaging across diverse care settings may help mitigate downstream disparities in treatment planning and outcomes while acknowledging broader systemic factors that influence DLBCL prognosis (Tiu et al., 2021; Kassaw et al., 2026).

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Follicular Lymphoma (ONC-27.3)

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Criteria

- This section applies to follicular lymphomas with WHO grade of 1 (low) or 2 (intermediate) and primary cutaneous follicle center lymphoma. Grade 3 (high) follicular lymphomas should be imaged according to guidelines found in: **Diffuse Large B Cell Lymphoma (DLBCL) (ONC-27.2)**.

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of follicular lymphomas	EITHER of the following: • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) OR • PET/CT (CPT® 78815)
For ANY of the following in individuals with follicular lymphoma, if PET/CT has not yet been performed: • If radiation therapy is being considered for stage I or II disease • CT results lead to a plan for systemic therapy	• PET/CT (CPT® 78815 or CPT® 78816)
Treatment response in individuals with follicular lymphoma	• CT with contrast of previously involved area(s) every 2 cycles of therapy

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Indication	Medically Necessary Imaging Study
End of active therapy evaluation (typically approximately 6 cycles) in individuals with follicular lymphoma	ONE of the following may be approved: • PET/CT (CPT® 78815 or CPT® 78816) OR • CT Chest with contrast (CPT® 71260) and • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)
Suspected recurrence in individuals with follicular lymphoma	ANY or ALL of the following may be approved: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)
Suspected transformation (Richter's) from a low grade lymphoma to a more aggressive type based on one or more of the following: • New B symptoms • Rapidly growing lymph nodes • Extranodal disease develops • Significant recent rise in LDH above normal range	• PET/CT (CPT® 78815 or CPT® 78816)
Surveillance in individuals with follicular lymphoma for ANY of the following: • After completion of active treatment • On maintenance treatment • Observation without any treatment	For all stages, every 6 months for two years, then annually: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)
Surveillance of pediatric-type follicular lymphoma in adults	Routine advanced imaging is not considered medically necessary after complete response

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Background and Supporting Information

Follicular lymphoma (FL) is an indolent B-cell non-Hodgkin lymphoma characterized by a relapsing and remitting clinical course with variable disease burden and risk of transformation to aggressive lymphoma. The clinical course of FL may include histologic transformation to aggressive lymphoma, which is associated with worse outcomes (Barrington et al., 2014; Cheson et al., 2014; NCCN, 2026).

Evidence Discussion

The recommendation to use either diagnostic CT or PET/CT for initial staging is supported by evidence that both modalities provide clinically meaningful information in follicular lymphoma. PET/CT improves detection of nodal and extranodal disease compared with CT alone and can alter staging in a minority of cases, while CT provides adequate anatomic staging when PET is not performed. Baseline PET/CT is particularly valuable when systemic therapy is planned or when radiation therapy is considered for early-stage disease, as it establishes a metabolic reference for subsequent response assessment (Barrington et al., 2014; Cheson et al., 2014; NCCN, 2026).

For treatment response assessment, the recommendation to perform CT every 2 cycles is supported by evidence demonstrating that interim PET/CT has limited prognostic reliability in FL compared with aggressive lymphomas. While PET/CT can provide early metabolic information, studies show that interim PET findings are less consistently associated with outcomes, supporting the use of CT for serial evaluation during therapy. In contrast, end-of-treatment PET/CT provides improved sensitivity and specificity for detecting residual disease, with studies demonstrating that PET reclassifies a substantial proportion of patients deemed non-complete response by CT into complete metabolic remission, thereby improving risk stratification and guiding subsequent management (Dupuis et al., 2012; Barrington et al., 2014).

The recommendation for PET/CT in suspected transformation is supported by evidence that increased FDG uptake correlates with aggressive histology. Studies demonstrate that an SUV greater than 10 is highly predictive of aggressive lymphoma, and PET/CT is valuable for identifying the most metabolically active lesion to target biopsy. However, PET findings alone are not diagnostic of transformation and must be confirmed histologically, supporting its role as a targeted diagnostic adjunct rather than a stand-alone test (Noy et al., 2009; Barrington et al., 2014).

Surveillance recommendations reflect limited evidence for routine imaging benefit in indolent lymphomas. Most relapses occur within the first 2 years after treatment, supporting periodic CT during this interval and less frequent imaging thereafter. PET/CT is not recommended for routine surveillance due to false-positive rates approaching 20%, which may lead to unnecessary biopsies, additional imaging, increased costs, and patient anxiety without demonstrated survival benefit. Studies of lymphoma surveillance imaging similarly show no clear improvement in survival with routine imaging compared

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with clinical follow-up, supporting a risk-adapted approach (Lynch et al., 2014; Dupuis et al., 2012; NCCN, 2026).

The exception for pediatric-type follicular lymphoma is supported by evidence indicating no survival benefit from surveillance imaging compared with clinical detection of recurrence. Across all scenarios, the criteria balance the benefits of early detection of clinically significant disease with the harms of over-imaging, emphasizing selective use of PET/CT and structured CT surveillance aligned with disease biology and risk of relapse (NCCN, 2026; Lynch et al., 2014).

Health Equity Considerations

Follicular lymphoma (FL) demonstrates persistent disparities in survival that are strongly associated with socioeconomic status, geography, and access to care, despite overall improvements in outcomes in the modern treatment era. Population-based analyses from California show that although survival has improved across racial and ethnic groups following the introduction of rituximab-based therapies, patients residing in lower-income neighborhoods experience significantly worse overall and disease-specific survival, independent of stage at diagnosis, age, or race/ethnicity (Keegan et al., 2009). These findings suggest that long-term disease management, which is central to FL given its indolent and relapsing course, may be particularly sensitive to inequities in healthcare access, continuity of follow-up, and quality of supportive care. Additional national data indicate that rural and non-metropolitan patients with FL have poorer overall survival compared with metropolitan patients, a disparity largely mediated by differences in insurance coverage, regional income levels, and treatment at lower-resource community facilities rather than academic centers (Ritter et al., 2020).

Geographic and environmental contexts further contribute to inequities in FL incidence and outcomes. National SEER analyses demonstrate that FL incidence varies by race/ethnicity and socioeconomic context, with lower incidence observed among non-Hispanic Black and Hispanic populations, potentially reflecting underdiagnosis or differential exposure to healthcare systems rather than true biologic protection (Blansky et al., 2020). While urban–rural differences in FL incidence are less pronounced than for other lymphoma subtypes, patients from non-metropolitan and rural areas are more likely to have lower socioeconomic status and limited access to specialized diagnostic services, including advanced imaging used for staging and response assessment (Blansky et al., 2020; Ritter et al., 2020). These data underscore the importance of equitable access to recommended imaging across care settings. Consistent application of evidence-based imaging can help mitigate disparities by supporting accurate staging, appropriate surveillance, and timely detection of transformation or progression, thereby reducing downstream inequities in outcomes for patients with follicular lymphoma.

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Marginal Zone Lymphomas (ONC-27.4)

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Criteria

- MALT lymphomas in any location and primary cutaneous marginal zone lymphoma should also be imaged according to these guidelines.
- Splenic Marginal Zone Lymphoma is diagnosed with splenomegaly, peripheral blood flow cytometry and bone marrow biopsy. Splenectomy is diagnostic and therapeutic. PET scan is not routinely considered medically necessary prior to splenectomy.

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of marginal zone lymphomas	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
EITHER of the following in individuals with marginal zone lymphomas: • If radiation therapy is being considered for stage I or II disease • If systemic therapy is planned	• PET/CT (CPT® 78815 or CPT® 78816)
Treatment response in individuals with marginal zone lymphomas	• CT with contrast of previously involved area(s) every 2 cycles of therapy
End of therapy evaluation in individuals with marginal zone lymphomas	ONE of the following: • CT with contrast of previously involved area(s) • PET/CT (CPT® 78815 or CPT® 78816)

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Indication	Medically Necessary Imaging Study
Suspected recurrence in individuals with marginal zone lymphomas	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)
Suspected recurrence in individuals with marginal zone lymphomas and ANY of the following: • Symptoms of end organ dysfunction • Clinically significant or progressive cytopenias • Bulky disease (single mass of 7cm or greater or 3 or more nodal sites 3cm in diameter) • Steady or rapid progression	In addition to the CT imaging above: • PET/CT (CPT® 78815 or CPT® 78816)
Surveillance of all stages of nodal marginal zone lymphoma for any of the following: • After completion of active treatment • On maintenance treatment • Observation without any treatment	Every 6 months for two years, then annually: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)

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Indication	Medically Necessary Imaging Study
Surveillance of all stages of extranodal marginal zone lymphoma	Advanced imaging is not routinely considered medically necessary for surveillance of asymptomatic individuals

Background and Supporting Information

Marginal zone lymphomas (MZL) are a heterogeneous group of indolent B-cell lymphomas that include extranodal marginal zone lymphoma (MALT lymphoma), splenic marginal zone lymphoma (SMZL), and nodal marginal zone lymphoma (NMZL). These entities differ in clinical presentation, typical sites of involvement, and patterns of dissemination, with extranodal disease often arising in mucosal tissues such as the stomach, ocular adnexa, lung, and salivary glands, while SMZL typically involves the spleen, bone marrow, and peripheral blood (Zucca et al., 2020).

Diagnosis integrates clinical findings, laboratory evaluation, bone marrow assessment, and histopathology, often supported by imaging for disease extent. The clinical course of MZL is generally indolent, with many patients presenting with localized disease (particularly extranodal MZL) or slowly progressive disseminated disease (especially nodal and splenic subtypes). Disease progression and treatment decisions are guided by clinical symptoms, organ involvement, cytopenias, and tumor burden rather than imaging alone (Zucca et al., 2020; NCCN, 2026).

Evidence Discussion

The recommendation for CT chest, abdomen, and pelvis with contrast for initial staging is supported by guideline-based evidence that cross-sectional imaging is essential for determining the extent of nodal and extranodal disease. CT provides reliable anatomic assessment across all MZL subtypes and remains the standard staging modality. PET/CT has a more limited role at diagnosis because FDG avidity is variable, particularly in extranodal marginal zone lymphoma, where only approximately 50%–75% of tumors demonstrate significant uptake, limiting its sensitivity and consistency in staging (Zucca et al., 2020; Barrington et al., 2014).

Selective use of PET/CT when systemic therapy is planned or when radiation therapy is considered for localized disease is supported by its ability to identify occult disease sites and establish a metabolic baseline for response assessment. In localized disease, PET/CT may help exclude disseminated involvement prior to definitive local therapy such as radiotherapy. In patients undergoing systemic therapy, baseline PET/CT provides a reference for evaluating treatment response and identifying patients who may require therapy intensification (Barrington et al., 2014; NCCN, 2026).

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For treatment response, the recommendation for serial CT imaging every 2 cycles reflects the lack of clear evidence supporting routine interim PET/CT in MZL. Current data indicate that PET/CT does not have a well-established role in interim restaging due to variable FDG avidity and uncertain prognostic value. At the end of therapy, however, PET/CT may provide incremental value in identifying residual metabolically active disease and distinguishing viable lymphoma from post-treatment changes, which can guide the need for additional therapy and reduce risks of both under- and overtreatment (Zucca et al., 2020; Barrington et al., 2014).

Surveillance strategies are based on the indolent nature of MZL and the limited evidence supporting routine imaging in asymptomatic patients. Extranodal marginal zone lymphoma often remains localized with a low risk of systemic progression, and routine advanced imaging has not demonstrated a survival benefit in asymptomatic individuals. For nodal MZL, periodic CT imaging is supported due to a higher likelihood of disseminated disease and relapse within the first two years, aligning with observed relapse patterns. Routine PET/CT surveillance is not recommended due to false-positive rates approaching 20%, which can result in unnecessary biopsies, additional imaging, increased cost, radiation exposure, and patient anxiety without improving outcomes (Lynch et al., 2014; NCCN, 2026; Zucca et al., 2020).

PET/CT is appropriately reserved for specific clinical scenarios such as suspected recurrence with high-risk features (e.g., cytopenias, bulky disease, organ dysfunction, or rapid progression) or suspected transformation, where increased FDG uptake can help identify aggressive disease and guide biopsy. This selective use balances the potential diagnostic benefit of PET/CT with its known harms, ensuring imaging is targeted to situations where it meaningfully impacts management (Barrington et al., 2014; Zucca et al., 2020).

Health Equity Considerations

Marginal zone lymphomas (MZL) represent a heterogeneous group of indolent lymphomas whose epidemiology, clinical presentation, and management are strongly influenced by geographic, infectious, and sociodemographic factors, creating important equity considerations. Extranodal MZL, particularly mucosa-associated lymphoid tissue (MALT) lymphoma, is closely linked to chronic infections and autoimmune conditions, including Helicobacter pylori, hepatitis C virus, and Sjögren syndrome, which occur with variable prevalence across populations and regions (Cheah et al., 2023; Noor et al., 2026). Geographic variation in infectious exposures contributes to differences in disease incidence and subtype distribution worldwide and may delay diagnosis in populations with limited access to specialty care or endoscopic, serologic, and pathologic testing needed to identify underlying etiologic drivers (Noor et al., 2026). Older age at diagnosis, comorbid autoimmune disease, and socioeconomic barriers to longitudinal surveillance are common in MZL and may compound disparities in

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outcomes, particularly given the prolonged natural history and reliance on observation or response-adapted treatment strategies (Cheah et al., 2023).

Equitable access to appropriate imaging is a critical component of MZL care, as staging and response assessment differ by subtype and anatomic site. While PET/CT is not uniformly recommended across all MZL presentations, it plays an important role in selected cases to confirm disease extent, evaluate treatment response, and detect histologic transformation, which is associated with worse prognosis (Noor et al., 2026). Patients in rural or resource-limited settings may experience reduced access to PET/CT, site-specific imaging (e.g., MRI for ocular adnexal or CNS disease), or endoscopic surveillance for gastric MALT lymphoma, potentially leading to under-staging or delayed recognition of progression (Cheah et al., 2023). Consistent, evidence-based application of imaging recommendations across practice settings is essential to mitigate disparities, support accurate risk stratification, and ensure timely intervention for patients with marginal zone lymphomas regardless of geography, socioeconomic status, or underlying etiologic factors.

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Mantle Cell Lymphoma (ONC-27.5)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of mantle cell lymphoma	ONE of the following: • CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) OR • PET/CT (CPT® 78815 or CPT® 78816)
Treatment response in individuals with mantle cell lymphoma	• PET/CT (CPT® 78815 or CPT® 78816) or CT with contrast of previously involved area(s) every 2-4 cycles of therapy
End of therapy evaluation in individuals with mantle cell lymphoma	ONE of the following: • CT with contrast of previously involved area(s) • PET/CT (CPT® 78815 or CPT® 78816)
Suspected recurrence in individuals with mantle cell lymphoma	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) • PET/CT can be considered in rare circumstances (e.g., bone involvement).
Surveillance for all stages of mantle cell lymphoma	Every 6 months for 2 years, and then annually: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)

Background and Supporting Information

Mantle cell lymphoma (MCL) is a mature B-cell non-Hodgkin lymphoma characterized by a heterogeneous disease course ranging from indolent to aggressive behavior. It

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most commonly presents with advanced-stage disease involving lymph nodes, bone marrow, spleen, and extranodal sites, and carries a high risk of relapse, including late relapses occurring many years after initial remission (Guidot et al., 2018; NCCN, 2026).

Evidence Discussion

The recommendation to use either contrast-enhanced CT or PET/CT for initial staging is supported by guideline-based evidence demonstrating that both modalities provide comprehensive assessment of disease extent. PET/CT is generally preferred when systemic therapy is planned, as it improves detection of metabolically active disease sites and reduces the risk of underestimation of disease burden. This is particularly important in a disease such as MCL, which frequently presents with widespread involvement (Barrington et al., 2016; NCCN, 2026).

For interim treatment response, CT imaging every 2–4 cycles is supported by evidence showing that PET/CT has not consistently demonstrated improvement in outcomes when used for interim restaging. While PET/CT can detect early metabolic response, data do not support routine use for altering management during therapy. Therefore, CT remains the standard modality for serial anatomic assessment, reserving PET/CT for cases where disease is not well visualized on CT or when metabolic information is necessary (Barrington et al., 2016; NCCN, 2026).

At the end of therapy, PET/CT provides greater accuracy than CT alone for identifying residual metabolically active disease and distinguishing viable lymphoma from post-treatment changes. This distinction is clinically meaningful, as failure to achieve complete metabolic response may indicate the need for maintenance therapy or additional treatment. Thus, PET/CT at the end of therapy supports risk-adapted management and helps prevent both undertreatment and overtreatment (Barrington et al., 2016; Cheson et al., 2014).

For suspected recurrence, CT is supported for evaluation of disease burden, while PET/CT is reserved for select circumstances, such as evaluation of suspected bone involvement or when CT findings are inconclusive. This selective use reflects the balance between improved diagnostic sensitivity of PET/CT and its higher cost, radiation exposure, and potential for false-positive findings (Barrington et al., 2016).

Surveillance imaging recommendations reflect the limited clinical benefit of routine imaging in asymptomatic patients with MCL. Evidence demonstrates that detection of relapse through surveillance imaging does not improve overall survival compared with clinical detection. In a large retrospective cohort, relapse detected by surveillance imaging showed no survival advantage, and most relapses were identified through symptoms or clinical findings (Guidot et al., 2018). Additionally, PET/CT surveillance has a low positive predictive value of approximately 24%, leading to high rates of false positives and unnecessary downstream testing (Guidot et al., 2018). The harms of routine surveillance imaging include cumulative radiation exposure, increased

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healthcare costs, patient anxiety, and unnecessary invasive procedures resulting from false-positive findings. Despite these limitations, CT-based surveillance remains supported due to ongoing uncertainty and variability in clinical practice, as well as the potential for late relapse in MCL. PET/CT surveillance is not recommended given its low predictive value and lack of demonstrated survival benefit, supporting a conservative and risk-adapted imaging approach aligned with NCCN guidance (Guidot et al., 2018; NCCN, 2026).

Health Equity Considerations

Mantle cell lymphoma (MCL) is an aggressive B-cell non-Hodgkin lymphoma that disproportionately affects older adults and is associated with complex, resource-intensive management strategies, including cytarabine-based induction, autologous stem cell transplantation (ASCT), maintenance therapy, and increasingly costly targeted agents. Population-based analyses demonstrate significant racial and socioeconomic disparities in outcomes for patients with MCL. In a large National Cancer Database study, Black patients experienced inferior overall survival compared with White and Hispanic patients, independent of stage, insurance status, and treatment setting, despite being more likely to receive care at academic or research centers (Shah et al, 2019). Black and Hispanic patients were also more likely to be uninsured or covered by Medicaid, reside in lower-income and lower-education areas, and were less likely to undergo ASCT, a treatment associated with improved survival in eligible patients, highlighting persistent structural barriers to optimal care delivery (Shah et al., 2019).

Equity considerations are closely tied to imaging access and utilization in MCL, where advanced imaging plays a central role in initial staging, response assessment, and detection of relapse or transformation. Differences in access to timely diagnostic imaging and longitudinal surveillance may contribute to delayed treatment initiation, incomplete staging, or missed opportunities for potentially life-prolonging therapies, particularly among patients treated outside high-resource settings. Treatment at academic centers has been independently associated with improved survival, likely reflecting greater access to specialized imaging, multidisciplinary expertise, and clinical trials (Shah et al., 2019). Standardized, evidence-based imaging recommendations are essential to reduce variability in care, support equitable staging and monitoring, and ensure that socioeconomic or racial factors do not limit access to appropriate diagnostic imaging for patients with mantle cell lymphoma.

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Burkitt's Lymphomas (ONC-27.6)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of Burkitt's lymphomas	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Treatment response in individuals with Burkitt's lymphomas	• CT with contrast of previously involved area(s) every 2 cycles of therapy • PET/CT is not considered medically necessary for monitoring treatment response but can be considered in rare circumstances when CT did not show disease (e.g., bone).
End of therapy evaluation in individuals with Burkitt's lymphomas	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) at the end of chemotherapy and again at the end of radiation • CT with contrast of previously involved area(s)
Suspected recurrence in individuals with Burkitt's lymphomas	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) • PET/CT can be considered in rare circumstances (e.g., bone involvement).
Surveillance in individuals with Burkitt's lymphomas	Every 6 months for 2 years after completion of treatment: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)

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Background and Supporting Information

Burkitt lymphoma is an aggressive, rapidly proliferating B-cell non-Hodgkin lymphoma characterized by high tumor growth fraction and frequent extranodal involvement, particularly in the abdomen, bone marrow, and central nervous system. Due to its rapid doubling time and potential for life-threatening complications such as tumor lysis syndrome, accurate and rapid staging is essential to guide urgent treatment decisions. Imaging plays a critical role in defining disease extent, including nodal bulk, visceral involvement, and anatomic relationships relevant to both therapy planning and emergent management (Cheson et al., 2014; NCCN, 2026).

Evidence Discussion

The recommendation to use both contrast-enhanced CT and PET/CT for initial staging is supported by evidence demonstrating complementary roles of anatomic and functional imaging in aggressive lymphomas. CT is essential for defining the size, distribution, and anatomic relationships of nodal and extranodal disease, including abdominal viscera and Waldeyer's ring involvement, all of which influence treatment planning and urgent management. PET/CT provides baseline metabolic characterization of disease, which is particularly important in Burkitt lymphoma due to its high FDG avidity and the central role of metabolic response in assessing treatment efficacy (Cheson et al., 2014; NCCN, 2026).

For treatment response during therapy, CT imaging every two cycles is supported by the principle that complete response should not be defined until completion of the full treatment regimen. Interim PET/CT has not been shown to reliably alter outcomes in aggressive lymphomas and may lead to premature interpretation of response. Therefore, CT is preferred for serial assessment of tumor burden during therapy, reserving PET/CT for select cases in which disease is not well visualized on CT, such as osseous involvement (Cheson et al., 2014; NCCN, 2026).

At the end of therapy, PET/CT is medically necessary because metabolic response provides critical prognostic and management information. Evidence demonstrates that FDG avidity distinguishes residual viable lymphoma from post-treatment fibrosis or necrosis more accurately than CT alone. Lack of complete metabolic response may indicate the need for additional therapy, such as treatment intensification or local therapy, while complete metabolic response supports treatment completion. This reinforces the combined use of PET/CT and CT at the end of therapy for comprehensive assessment (Cheson et al., 2014; NCCN, 2026).

For surveillance, the recommendations reflect the aggressive biology of Burkitt lymphoma and the limited benefit of routine imaging. Clinical relapse typically presents with rapid symptom development, and available evidence suggests that recurrence is frequently identified through clinical evaluation rather than imaging. Routine PET/CT surveillance is discouraged due to high false-positive rates, unnecessary radiation

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exposure, increased costs, and lack of demonstrated survival benefit. CT-based surveillance every 6 months for 2 years aligns with guideline-supported practice, recognizing that relapse beyond this timeframe is rare and that continued imaging in asymptomatic individuals has not been shown to improve outcomes (Cheson et al., 2014; NCCN, 2026).

Health Equity Considerations

Burkitt lymphoma (BL) demonstrates pronounced global, regional, and sociodemographic disparities that have important implications for diagnosis, staging, and outcomes. Analyses of the Global Burden of Disease 2021 data show that BL incidence and prevalence are increasingly concentrated in high sociodemographic index (SDI) countries, while mortality rates and disability-adjusted life years (DALYs) remain disproportionately higher in low-SDI regions, particularly in sub-Saharan Africa (Dou et al., 2025; Wang et al., 2024; Zhou et al., 2026). These patterns reflect differences in underlying risk factors (e.g., Epstein–Barr virus, malaria, HIV), age and sex distributions, and critically, access to diagnostic and treatment resources. Children aged 0–14 years and adults over 65 years bear the highest burden globally, with consistently higher incidence, mortality, and DALYs among males, underscoring populations that may be especially vulnerable to delays in diagnosis and intervention in resource-limited settings (Dou et al., 2025; Zhou et al., 2026).

Inequities in health system capacity, including limited access to advanced imaging, pathology, and molecular diagnostics, are central drivers of survival disparities in BL. In low-SDI regions, high mortality despite stable or declining incidence suggests underdiagnosis, advanced stage at presentation, and restricted access to timely imaging for accurate staging and response assessment (Wang et al., 2024; Zhou et al., 2026). Conversely, rising incidence in high-SDI countries is partly attributed to improved diagnostic precision and broader imaging utilization, highlighting how access can influence apparent disease burden (Dou et al., 2025; Wang et al., 2024). Standardized, evidence-based imaging recommendations are essential to mitigate these disparities by supporting timely diagnosis, consistent staging, and equitable monitoring across care settings, ensuring that differences in socioeconomic status or geographic location do not limit access to appropriate imaging in patients with Burkitt lymphoma.

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Lymphoblastic Lymphomas (ONC-27.7)

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- Individuals with lymphoblastic lymphoma (even those with bulky nodal disease) are treated using the leukemia treatment plan appropriate to the cell type (B or T cell). Imaging indications in adult individuals are identical to those for pediatric individuals. See: **Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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T Cell Lymphomas (ONC-27.8)

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Criteria

- Includes Peripheral T-Cell Lymphomas, Mycosis Fungoides/Sézary Syndrome, Anaplastic Large Cell Lymphoma (ALCL) including breast implant-associated ALCL, Angioimmunoblastic lymphoma, and Primary Cutaneous CD30+T Cell Lymphoproliferative Disorders

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of T cell lymphomas	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
T-cell lymphoma of nasal cavity, oropharynx, or nasopharynx	In addition to the imaging above: • MRI Orbits, Face, and Neck without and with contrast (CPT® 70543)
Breast implant-associated ALCL	In addition to the above initial staging studies: • Ultrasound Breast (CPT® 76641 or CPT® 76642) ◦ MRI Breast (CPT® 77049) for evaluation of inconclusive ultrasound findings
Treatment response in individuals with T cell lymphomas	Any ONE of the following after 3-4 cycles: • PET/CT (CPT® 78815 or 78816) or • CT Chest with contrast (CPT® 71260), and • CT Abdomen and Pelvis with contrast (CPT® 74177) and • CT with contrast of previously involved area(s)

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Indication	Medically Necessary Imaging Study
End of therapy evaluation in individuals with T cell lymphomas	Any ONE of the following at the end of chemotherapy and again at the end of radiation therapy: • PET/CT (CPT® 78815 or CPT® 78816) or • CT Chest with contrast (CPT® 71260), and • CT Abdomen and Pelvis with contrast (CPT® 74177), and • CT with contrast of previously involved area(s)
Suspected recurrence in individuals with T cell lymphomas	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) • PET/CT can be considered in rare circumstances (e.g., bone involvement).
Surveillance, all stages of T cell lymphomas	Every 6 months for 2 years, then annually for 5 years: • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and CT of previously involved areas ◦ PET/CT (CPT® 78815 or CPT® 78816) is considered medically necessary instead of CT for individuals with a history of extranodal disease that was not adequately imaged by conventional imaging

Background and Supporting Information

T-cell lymphomas represent a heterogeneous group of aggressive and indolent non-Hodgkin lymphomas that include peripheral T-cell lymphomas (PTCL), cutaneous T-cell lymphomas, anaplastic large cell lymphoma (ALCL), angioimmunoblastic T-cell lymphoma, and extranodal NK/T-cell lymphomas. These diseases frequently present with advanced-stage involvement and have a high propensity for extranodal disease, including the skin, gastrointestinal tract, liver, bone marrow, and nasopharyngeal structures (NCCN, 2026).

Evidence Discussion

The recommendation for combined use of PET/CT and contrast-enhanced CT for initial staging is supported by evidence demonstrating the high frequency of extranodal

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disease in T-cell lymphomas and the limitations of single-modality imaging. PET/CT improves sensitivity for detecting metabolically active nodal and extranodal disease, including noncontiguous lymph nodes and visceral involvement that may be missed on regional CT imaging alone. However, PET/CT may have limitations in defining anatomic detail, particularly in complex regions such as Waldeyer's ring or gastrointestinal involvement, supporting the complementary use of diagnostic contrast-enhanced CT to ensure accurate staging and avoid under- or over-treatment (Barrington et al., 2016; NCCN, 2026).

For treatment response, the recommendation to perform imaging after 3–4 cycles is supported by evidence that early imaging may lead to inaccurate assessment of treatment effect and inappropriate modification of therapy. Both PET/CT and CT are acceptable for response assessment, with modality selection guided by which imaging best demonstrated disease at baseline. PET/CT provides metabolic response data, while CT provides anatomic assessment, and either modality is sufficient when used consistently for comparison. Repeat imaging at standardized intervals improves reliability of response evaluation and supports appropriate continuation or modification of therapy (Barrington et al., 2016; NCCN, 2026).

At the end of therapy, the use of PET/CT or CT is supported by evidence that both modalities can evaluate residual disease, with PET/CT offering improved specificity for distinguishing viable tumor from post-treatment changes. Persistent PET-positive lesions may require biopsy confirmation prior to additional therapy due to the risk of false-positive findings, reinforcing the importance of integrating imaging results with clinical and pathologic data (Barrington et al., 2016; NCCN, 2026).

Surveillance imaging recommendations reflect the balance between early detection of relapse and the absence of demonstrated overall survival benefit. Evidence indicates that routine imaging does not clearly improve survival compared with clinical detection, although some data suggest improved progression-free survival with imaging-based detection of relapse. CT-based surveillance is supported at defined intervals to align with NCCN guidance, while PET/CT is generally not recommended due to false-positive rates approaching 20%, increased radiation exposure, cost, and risk of unnecessary invasive procedures. The selective use of PET/CT in surveillance for individuals with disease not well visualized on CT (e.g., extranodal involvement) is supported by its ability to detect metabolically active disease not captured by conventional imaging. However, its routine use is limited by lack of survival benefit and higher rates of incidental findings. Overall, the imaging criteria reflect a risk-adapted approach that prioritizes diagnostic accuracy during staging and response assessment while minimizing harm from overuse of advanced imaging during surveillance (Barrington et al., 2016; Lynch et al., 2014; NCCN, 2026).

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Health Equity Considerations

T-cell lymphomas (TCLs) exhibit substantial and persistent inequities in incidence, diagnosis, treatment, and outcomes that are closely linked to race, ethnicity, socioeconomic status, and health system factors. Population-based analyses consistently demonstrate worse overall survival for older adults, males, and racial and ethnic minority populations, with no meaningful improvement in survival over several decades despite therapeutic advances (Crozier et al., 2015). Cutaneous T-cell lymphoma (CTCL), in particular, shows marked racial and socioeconomic gradients in incidence, with higher rates among Black patients and individuals residing in higher-income census tracts, likely reflecting a combination of biological susceptibility, delayed diagnosis related to misclassification as benign skin conditions, and differential access to dermatologic subspecialty care (Wiese et al., 2023). These patterns highlight how structural inequities and diagnostic access influence both disease recognition and apparent disease burden across populations.

Social determinants of health play a critical role in outcomes for nodal peripheral T-cell lymphomas (PTCL), extending beyond traditional clinical prognostic factors. Recent large-scale analyses demonstrate that treatment at academic or NCI-designated cancer centers, insurance coverage, and educational attainment are among the strongest independent predictors of lymphoma-specific survival, with treatment at an academic center associated with nearly a 30% reduction in mortality risk (Mead et al., 2025). Patients from less-resourced communities are significantly less likely to receive care at specialized centers and therefore may have limited access to advanced imaging, multidisciplinary expertise, and clinical trials essential for optimal staging and response assessment. Standardized, evidence-based imaging recommendations support health equity by promoting timely diagnosis, accurate staging, and consistent disease monitoring across care settings, helping to mitigate disparities driven by geographic location, insurance status, and differential access to specialized oncology services in patients with T-cell lymphomas.

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Post-Transplant Lymphoproliferative Disorders (ONC-27.9)

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Criteria

- This section applies to Monomorphic (B-cell type) post-transplant lymphoproliferative disorder (PTLD) and Polymorphic PTLD.
- For Hodgkin-lymphoma subtype of PTLD, see: **Hodgkin Lymphomas (ONC-28)** for imaging recommendations.

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of PTLD	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Treatment response in individuals with PTLD	ANY or ALL of the following after 4 weeks of reducing immunosuppression or every 2 cycles (6-8 weeks) of chemo/ immunotherapy: • CT Chest with contrast (CPT® 71260), and • CT Abdomen and Pelvis with contrast (CPT® 74177), and • CT with contrast of previously involved area(s)
End of therapy evaluation in individuals with PTLD	ANY one of the following at the end of treatment: • PET/CT (CPT® 78815 or CPT® 78816) or • CT Chest with contrast (CPT® 71260), and • CT Abdomen and Pelvis with contrast (CPT® 74177), and • CT with contrast of previously involved area(s)
Suspected recurrence in individuals with PTLD	• CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
Surveillance in individuals with PTLD	See disease-specific guideline

Background and Supporting Information

Post-transplant lymphoproliferative disorders (PTLD) comprise a spectrum of lymphoid proliferations arising in the setting of immunosuppression following solid organ or hematopoietic stem cell transplantation. These disorders are strongly associated with impaired immune surveillance and Epstein-Barr virus (EBV) infection and may range from polymorphic proliferations to monomorphic lymphomas resembling aggressive non-Hodgkin lymphoma, often involving nodal and extranodal sites (Pan et al., 2021; NCI, 2025).

PTLD frequently presents with multisite and extranodal disease, including involvement of the gastrointestinal tract, liver, lungs, and central nervous system, reflecting the systemic nature of immune dysregulation in transplant recipients. Imaging plays an essential role in defining disease extent for staging and therapeutic planning, particularly in distinguishing localized from disseminated disease, which has implications for treatment selection including local versus systemic therapy (NCI, 2025; NCCN, 2026).

Initial management commonly involves reduction of immunosuppression (RIS), which may lead to regression of disease but carries risks such as allograft rejection and variable response rates, often necessitating additional therapy with rituximab or chemoimmunotherapy. Disease biology, tumor burden, and extent of involvement are important determinants of prognosis and guide management strategies, reinforcing the importance of accurate imaging-based staging and response assessment (Pan et al., 2021; NCI, 2025).

Evidence Discussion

The recommendation for combined use of PET/CT and contrast-enhanced CT for initial staging is supported by evidence demonstrating that PTLD frequently presents with extranodal and multisite disease that may not be fully detected with regional CT imaging alone. FDG PET/CT improves sensitivity for identifying metabolically active disease sites, while diagnostic CT provides detailed anatomic characterization necessary to differentiate bulky masses from noncontiguous nodal disease and to guide treatment planning. Accurate identification of disease extent is critical because localized disease may be treated with local therapy, whereas disseminated disease requires systemic treatment, and underestimation of disease burden may lead to undertreatment (Cheson et al., 2014; Barrington et al., 2014; NCCN, 2026).

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For treatment response, the recommendation to use CT at defined intervals, including as early as 4 weeks after reduction of immunosuppression, is supported by the rapid clinical dynamics of PTLD. Evidence indicates that median time to failure of reduction of immunosuppression is relatively short, approximately 45 days, necessitating early reassessment to ensure timely escalation of therapy. CT provides reliable anatomic assessment for serial monitoring, while interim PET/CT is not required for directing changes in therapy due to lack of evidence supporting improved outcomes from PET-driven early intervention. Suspicious findings on CT should be confirmed with biopsy to avoid misclassification (Pan et al., 2021; NCI, 2025; Cheson et al., 2014).

At the end of therapy, PET/CT is supported to confirm complete metabolic response, which is important for determining treatment completion versus the need for further therapy. Functional imaging has greater specificity than CT for distinguishing viable lymphoma from residual fibrotic or necrotic tissue, reducing the risk of both overtreatment and undertreatment. When a complete metabolic response is achieved, additional diagnostic CT imaging does not provide incremental benefit, supporting the use of PET/CT as a standalone modality in this setting (Cheson et al., 2014; Barrington et al., 2014).

The recommendation against routine surveillance imaging is supported by evidence demonstrating no improvement in outcomes with imaging-based surveillance in PTLD. Surveillance imaging exposes individuals to cumulative radiation, increased healthcare costs, and a higher likelihood of false-positive findings that may lead to unnecessary biopsies and interventions. Instead, monitoring with clinical evaluation and EBV PCR is preferred, as PTLD recurrence is often detectable through clinical or laboratory changes. This approach minimizes harm while maintaining effective detection of clinically meaningful relapse (NCI, 2025; Pan et al., 2021).

Health Equity Considerations

Post-transplant lymphoproliferative disorders (PTLD) represent a serious and disproportionate malignancy risk among solid organ and hematopoietic stem-cell transplant recipients, reflecting inequities driven by immunosuppression intensity, Epstein–Barr virus (EBV) serostatus, transplant type, and access to long-term specialty care. Large registry and cohort studies demonstrate that PTLD incidence is markedly higher in transplant recipients than in immunocompetent populations, with risk varying substantially by organ transplanted, donor–recipient EBV mismatch, cumulative immunosuppression, and age, and with a bimodal distribution that includes both early and late presentations (Dierickx & Habermann, 2018). These patterns underscore the importance of equitable access to consistent, lifelong post-transplant monitoring, as delayed recognition, particularly in late-onset or EBV-negative disease, can worsen outcomes. Vulnerable populations may face additional barriers to timely evaluation, including fragmented follow-up across transplant and oncology systems, geographic

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distance from transplant centers, and limited access to advanced diagnostic imaging and subspecialty pathology review.

Data suggest that outcomes for PTLD have improved in the modern era with standardized treatment pathways and multidisciplinary management, yet these gains may not be uniformly realized across care settings (Katz-Greenberg et al., 2021). Contemporary series highlight the central role of reduction of immunosuppression, risk-adapted chemoimmunotherapy, and FDG-PET/CT for staging and response assessment, while also demonstrating variability in metabolic profiles and disease burden at presentation that can influence prognosis. Ensuring equitable access to guideline-concordant imaging, including PET/CT for accurate staging of extranodal and allograft involvement, is critical, as under-staging can lead to suboptimal therapy. Standardized imaging recommendations for PTLD help promote equitable care by supporting timely diagnosis, consistent disease assessment, and coordinated management across transplant and oncology services, thereby reducing disparities related to care fragmentation, resource availability, and variability in practice patterns (Dierickx & Habermann, 2018; Katz-Greenberg et al., 2021).

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Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma (ONC-27.10)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • PET/CT (CPT® 78815 or CPT® 78816)
Treatment response in individuals with Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma	• CT with contrast of previously involved area(s) every 2 cycles of therapy
End of therapy evaluation in individuals with Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma	• CT with contrast of previously involved area(s)
Suspected recurrence in individuals with Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma	ANY or ALL of the following: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)

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Indication	Medically Necessary Imaging Study
Surveillance in individuals with Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma	No advanced imaging for surveillance
Individuals with Waldenström Macroglobulinemia or Lymphoplasmacytic Lymphoma with bony lesions	See: **Multiple Myeloma and Plasmacytomas (ONC-25)**

Background and Supporting Information

Waldenström macroglobulinemia (WM), also referred to as lymphoplasmacytic lymphoma (LPL), is a rare indolent B-cell malignancy characterized by bone marrow infiltration of lymphoplasmacytic cells and production of monoclonal immunoglobulin M (IgM) protein. Diagnosis requires both bone marrow involvement and the presence of IgM monoclonal gammopathy, and clinical manifestations are related to tumor burden, organ infiltration, or IgM-mediated effects such as hyperviscosity (Dimopoulos & Kastritis, 2019; Thomas et al., 2019).

The disease course is often indolent with prolonged asymptomatic phases, and treatment decisions are driven by symptoms, organ involvement, cytopenias, and IgM-related complications rather than imaging findings alone. Imaging is not required for diagnosis but may aid in identifying lymphadenopathy, organomegaly, and extranodal disease, contributing to assessment of tumor burden and clinical complications (Dimopoulos & Kastritis, 2019; Thomas et al., 2019).

Monitoring of WM/LPL is primarily based on laboratory parameters including IgM levels, serum proteins, and bone marrow involvement. Imaging findings may be variable, and disease burden may not correlate directly with imaging abnormalities, reflecting the biologic heterogeneity of bone marrow infiltration and paraprotein production (Banwait et al., 2011; Dimopoulos & Kastritis, 2019).

Evidence Discussion

The recommendation for contrast-enhanced CT of the chest, abdomen, and pelvis and/or PET/CT for initial staging is supported by NCCN, which considers both diagnostic CT and PET/CT acceptable for evaluation of disease extent in Waldenström

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macroglobulinemia/LPL (NCCN, 2026). CT provides reliable anatomic assessment of lymphadenopathy and organomegaly, while PET/CT may improve detection of metabolically active disease and marrow involvement. Prospective data demonstrate that combined PET/CT detects disease in a higher proportion of patients than CT alone (83% vs. 69%), supporting its equivalency as an imaging option at diagnosis (Banwait et al., 2011; NCCN, 2026; Thomas et al., 2019).

For treatment response, NCCN supports serial contrast-enhanced CT imaging every 2 cycles and at the end of therapy to assess anatomic disease burden and prevent undertreatment (NCCN, 2026). This approach is reinforced by evidence showing that although PET/CT may demonstrate metabolic changes, response in WM/LPL is primarily defined by monoclonal IgM levels rather than imaging findings. Studies show no statistically significant correlation between FDG-PET response criteria and monoclonal protein response, limiting the utility of PET/CT for routine restaging (Banwait et al., 2011; Dimopoulos & Kastritis, 2019; NCCN, 2026). Accordingly, CT remains the preferred modality for interval response assessment.

At the end of therapy and in suspected recurrence, NCCN supports continued use of contrast-enhanced CT to evaluate previously involved areas and detect progression or recurrence (NCCN, 2026). CT provides consistent, reproducible anatomic assessment of nodal and extranodal disease, while PET/CT is not routinely recommended due to its inconsistent correlation with disease biology. Imaging findings must be interpreted alongside laboratory parameters, as tumor burden may not parallel IgM levels or marrow involvement, reducing the incremental value of PET/CT in these settings (Banwait et al., 2011; Dimopoulos & Kastritis, 2019; NCCN, 2026).

The recommendation against routine surveillance imaging is strongly supported by NCCN and clinical evidence demonstrating that WM/LPL is best monitored through laboratory parameters, including IgM levels, serum proteins, and blood counts (NCCN, 2026). Imaging has no established role in asymptomatic surveillance because it does not reliably reflect disease activity or improve outcomes. Additionally, unnecessary imaging introduces harms including radiation exposure, cost, and incidental findings without demonstrated clinical benefit. Clinical and laboratory monitoring therefore remain the standard approach for follow-up (Dimopoulos & Kastritis, 2019; Thomas et al., 2019; NCCN, 2026).

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Hodgkin Lymphoma (ONC-28)

Guideline

Hodgkin Lymphoma – General Considerations (ONC-28.1)
Classical Hodgkin Lymphoma (ONC-28.2)
Nodular Lymphocyte – Predominant Hodgkin Lymphoma (ONC-28.3)
References (ONC-28)

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Hodgkin Lymphoma – General Considerations (ONC-28.1)

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Criteria

- Individuals with AIDS-related lymphoma should be imaged according to the primary lymphoma histology.
- The **Deauville Criteria** are internationally accepted criteria, which utilize a 5-point scoring system for the FDG avidity of a Hodgkin's lymphoma or Non-Hodgkin's lymphoma tumor mass as seen on FDG PET.
  - Score 1: No uptake above the background
  - Score 2: Uptake ≤mediastinum
  - Score 3: Uptake >mediastinum but ≤liver
  - Score 4: Uptake moderately increased compared to the liver at any site
  - Score 5: Uptake markedly increased compared to the liver at any site
  - Score X: New areas of uptake unlikely to be related to lymphoma

Indication	Medically Necessary Imaging Study
• Biopsy proven lymphoma, or • Suspected lymphoma and any one of the following: ◦ Bulky lymphadenopathy (LN mass greater than 10cm) ◦ Hepatomegaly ◦ Splenomegaly ◦ B symptom: Unexplained fever, drenching night sweats, unintended weight loss greater than 10% total body weight	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast ◦ MRI without and with contrast for individuals who cannot tolerate CT contrast due to allergy or impaired renal function
Signs or symptoms of Hodgkin lymphoma involving the neck	• CT Neck with contrast (CPT® 70491)
Signs or symptoms suggesting CNS involvement with lymphoma	• MRI Brain without and with contrast (CPT® 70553) • See: **CNS Lymphoma (also known as Microglioma) (ONC-2.7)**

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Indication	Medically Necessary Imaging Study
Known or suspected bone involvement with lymphoma	• MRI without and with contrast of symptomatic or previously involved bony areas ◦ Bone scan is inferior to MRI for evaluation of known or suspected bone involvement with lymphoma
Determine a more favorable site for biopsy when a relatively inaccessible site is contemplated in individuals with Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816) ◦ PET/CT is not considered medically necessary for all other indications prior to histological confirmation of lymphoma
CAR-T cell therapy in individuals with Hodgkin lymphoma	Once before treatment and once 30-60 days after completion of treatment: • PET/CT (CPT® 78815 or CPT® 78816) Once at baseline prior to therapy if required by institutional protocol, and at any time for any new neurological symptoms: • MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Hodgkin lymphoma (HL) is a malignant lymphoid neoplasm characterized by the presence of Reed-Sternberg cells, with two primary subtypes: classic Hodgkin lymphoma (CHL) and nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL). Diagnosis is based on tissue biopsy, and clinical presentation commonly includes lymphadenopathy, hepatosplenomegaly, and systemic "B symptoms" such as fever, night sweats, and weight loss, which are key indicators of disease burden and prognosis according to major clinical guidelines (NCCN, 2026).

Risk stratification and staging are central to management and are determined by factors including disease stage, presence of bulky disease (e.g., mediastinal mass or nodal conglomerate >10cm), number of nodal regions involved, and laboratory features such as erythrocyte sedimentation rate (ESR). These parameters distinguish favorable, unfavorable, and advanced disease and guide treatment planning and imaging utilization (NCCN, 2026).

Evidence Discussion

The imaging criteria recommending contrast-enhanced CT of the chest, abdomen, and pelvis for suspected or biopsy-proven lymphoma are supported by NCCN guidelines, which emphasize comprehensive anatomic evaluation during initial workup. CT imaging

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reliably identifies lymphadenopathy, hepatosplenomegaly, and extranodal disease, all of which are critical for accurate staging and risk stratification. These anatomic findings directly influence classification into favorable, unfavorable, or advanced disease categories, thereby guiding treatment selection (NCCN, 2026).

Targeted imaging such as CT of the neck, MRI of the brain, and MRI of bone for specific clinical indications is supported by evidence that Hodgkin lymphoma can involve extranodal sites, including the central nervous system and osseous structures, although less commonly. MRI is preferred for evaluation of CNS and bone involvement due to superior soft-tissue contrast and sensitivity compared to other modalities, while bone scintigraphy has been shown to be inferior for detecting osseous disease, supporting the preference for MRI in these scenarios (NCCN, 2026).

The addition of PET/CT for selected indications, including determining a more favorable biopsy site, is supported by its superior ability to detect metabolically active disease and identify occult sites of involvement. NCCN guidelines recommend FDG-PET/CT as part of initial staging and response assessment, particularly because it may reveal disease sites not apparent on CT, thereby reducing the risk of sampling error and improving diagnostic yield when biopsy of less accessible lesions is being considered. The use of FDG-PET/CT with Deauville scoring provides a standardized and reproducible framework for response assessment, supporting treatment adaptation while minimizing unnecessary changes in therapy. NCCN emphasizes that PET findings must be interpreted carefully, as both false-positive and false-negative results can occur if imaging protocols are not standardized or if uptake is related to non-malignant causes such as inflammation. This highlights the importance of integrating imaging findings with clinical and pathologic data to avoid inappropriate management decisions. Restrictions on the use of PET/CT prior to histologic confirmation and in non-indicated scenarios are supported by the potential harms of overutilization, including false-positive findings, unnecessary procedures, and increased healthcare costs. NCCN explicitly notes that imaging results should not supersede biopsy confirmation and that PET/CT interpretation requires standardized acquisition and expert review to prevent misclassification of disease. These considerations balance diagnostic benefit with the risks of over-imaging, supporting selective and guideline-driven use of advanced imaging modalities (NCCN, 2026).

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Classical Hodgkin Lymphoma (ONC-28.2)

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Criteria

- This section applies to nodular sclerosis, mixed cellularity, lymphocyte-depleted and lymphocyte-rich subtypes of Hodgkin lymphoma.
- Pregnancy-specific considerations: US Abdomen (CPT® 76700) or MRI Abdomen without contrast (CPT® 74181) and MRI Pelvis without contrast (CPT® 72195) are considered medically necessary in lieu of PET/CT or CT imaging.
  - MRI Abdomen and MRI Pelvis may be performed after US Abdomen if staging is unclear on US.

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of classical Hodgkin lymphoma	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Prior to initiation of therapy if one month or more has passed since previous PET/CT was performed in individuals with classical Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816)
Treatment response in individuals with classical Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816) as frequently as every 2 cycles
End of chemotherapy and/or radiation therapy evaluation in individuals with classical Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816) at the end of chemotherapy and again at the end of radiation (at least 12 weeks after completion of radiation therapy)

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Indication	Medically Necessary Imaging Study
Suspected or biopsy proven recurrence in individuals with classical Hodgkin lymphoma	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) • PET/CT (CPT® 78815 or CPT® 78816) if suspected recurrence ≥3 months after completion of therapy
Surveillance in individuals with a history of recurrent classical Hodgkin lymphoma	ANY or ALL of the following, every 6 months for 2 years after completion of therapy: • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) In addition to the above studies: • A single follow-up PET/CT at three months if end of therapy PET/CT shows Deauville 4 or 5 FDG avidity
Surveillance in individuals with classical Hodgkin lymphoma in first remission (i.e., no history of recurrence)	• A single follow-up PET/CT at three months if end of therapy PET/CT shows Deauville 4 or 5 FDG avidity • Routine surveillance imaging is otherwise not considered medically necessary for asymptomatic individuals

Background and Supporting Information

Classical Hodgkin lymphoma (CHL) is a malignant lymphoid neoplasm defined by the presence of Reed-Sternberg cells and includes nodular sclerosis, mixed cellularity, lymphocyte-depleted, and lymphocyte-rich subtypes. Clinical presentation commonly includes lymphadenopathy, hepatosplenomegaly, and systemic "B symptoms," which are incorporated into staging and risk stratification systems that guide management (NCCN, 2026).

Staging and risk classification are based on extent of nodal involvement, presence of bulky disease (e.g., mediastinal mass or nodal conglomerate >10cm), extranodal disease, and laboratory parameters such as erythrocyte sedimentation rate. These factors distinguish favorable, unfavorable, and advanced disease categories and influence imaging strategies and treatment planning (NCCN, 2026).

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Evidence Discussion

The recommendation for FDG-PET/CT and contrast-enhanced CT of the neck, chest, abdomen, and pelvis for initial staging is strongly supported by NCCN guidance, which endorses integrated FDG-PET/CT as a standard component of the diagnostic workup for Hodgkin lymphoma. PET/CT provides whole-body metabolic assessment and can detect both nodal and extranodal disease, while contrast-enhanced CT offers detailed anatomic characterization, including identification of bulky disease and organ involvement. The combination of these modalities improves staging accuracy and informs risk stratification, which directly impacts treatment selection (NCCN, 2026).

The recommendation to repeat PET/CT prior to therapy if more than one month has elapsed and to use PET/CT for treatment response assessment every two cycles is supported by NCCN principles indicating that staging PET/CT should be performed within one month of therapy initiation and that interim PET imaging can guide response-adapted treatment strategies. PET-based response assessment using the Deauville scoring system allows early identification of treatment response or refractory disease, supporting optimization of therapy while minimizing both undertreatment and overtreatment (NCCN, 2026).

End-of-therapy PET/CT evaluation is supported by evidence demonstrating that metabolic response is predictive of treatment outcomes. NCCN recommends PET/CT at completion of chemotherapy and after radiation therapy, with careful timing to reduce false-positive findings related to post-treatment inflammation. The requirement for at least a 12-week interval after radiation therapy reflects the need to minimize inflammatory FDG uptake that could otherwise lead to misinterpretation and unnecessary interventions (NCCN, 2026).

For suspected or biopsy-proven recurrence, the use of CT and PET/CT imaging is supported by NCCN guidance recommending imaging for evaluation of relapse when clinically indicated. PET/CT is particularly useful for detecting metabolically active recurrent disease but should generally be performed at least 3 months after completion of therapy to avoid false-positive results. This approach balances sensitivity for recurrence detection with the risk of misclassification due to treatment-related changes (NCCN, 2026).

The recommendation for surveillance CT imaging every 6 months for 2 years is consistent with NCCN acknowledgment that imaging may be used selectively in follow-up when clinically indicated, though routine surveillance imaging, particularly PET/CT, is discouraged due to the risk of false-positive findings and lack of evidence demonstrating improved outcomes. NCCN specifically cautions against routine surveillance PET/CT and emphasizes that imaging findings should not be used in isolation without clinical or pathologic correlation. This reflects the balance between early detection of relapse and avoidance of unnecessary radiation exposure, cost, and downstream procedures (NCCN, 2026).

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Health Equity Considerations

Classical Hodgkin lymphoma (cHL) is a highly curable malignancy, yet substantial and persistent disparities in outcomes remain across socioeconomic and demographic groups. Population-based data demonstrate that patients from lower neighborhood socioeconomic status (SES) groups experience significantly worse overall and disease-specific survival compared with patients from higher SES neighborhoods, regardless of disease stage or age at diagnosis (Keegan et al., 2010). In addition, racial and ethnic disparities are evident, with Black and Hispanic patients experiencing higher mortality than non-Hispanic White patients even after adjustment for neighborhood SES, suggesting that structural barriers beyond stage at presentation influence outcomes (Keegan et al., 2010; Murthy et al., 2019). These inequities may reflect differences in access to timely diagnosis, high-quality staging, optimal multimodality treatment, survivorship care, and long-term surveillance, particularly in healthcare settings with limited resources.

More contemporary analyses indicate that overall survival for advanced-stage cHL has improved over time with modern treatment strategies; however, disparities by race, marital status, age, and socioeconomic factors persist at the population level (Murthy et al., 2019). Minority race and lack of social support have been independently associated with higher mortality, underscoring the role of nonbiological determinants such as access to subspecialty oncology care, adherence to therapy, and continuity of follow-up. Imaging plays a critical role in accurate staging, treatment response assessment, and detection of relapse or transformation, and disparities in access to advanced imaging modalities such as PET/CT may further exacerbate inequities in outcomes. Standardized, evidence-based imaging recommendations for cHL aim to promote equitable diagnostic evaluation and disease monitoring across diverse patient populations, helping to reduce variation in care and support optimal outcomes independent of socioeconomic or demographic factors (Keegan et al., 2010; Murthy et al., 2019).

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Nodular Lymphocyte – Predominant Hodgkin Lymphoma (ONC-28.3)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging/diagnosis of nodular lymphocyte-predominant Hodgkin lymphoma	ANY or ALL of the following: • PET/CT (CPT® 78815 or CPT® 78816) • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177)
Treatment response in individuals with nodular lymphocyte-predominant Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816) as frequently as every 2 cycles
End of chemotherapy and/or radiation therapy evaluation in individuals with nodular lymphocyte-predominant Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816) at the end of chemotherapy and again at the end of radiation (at least 12 weeks after completion of radiation therapy)
Suspected recurrence in individuals with nodular lymphocyte-predominant Hodgkin lymphoma	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s)
Biopsy proven recurrence in individuals with nodular lymphocyte-predominant Hodgkin lymphoma	• PET/CT (CPT® 78815 or CPT® 78816)

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Indication	Medically Necessary Imaging Study
Suspected transformation (Richter's) from a low-grade lymphoma to a more aggressive type based on one or more of the following: • New B symptoms • Rapidly growing lymph nodes • Extranodal disease develops • Significant recent rise in LDH above normal range	• PET/CT (CPT® 78815 or CPT® 78816)
Surveillance in individuals with nodular lymphocyte-predominant Hodgkin lymphoma	ANY or ALL of the following every 6 months for 2 years after completion of therapy: • CT Neck with contrast (CPT® 70491) • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CT with contrast of previously involved area(s) In addition to the above studies: • A single follow-up PET/CT at three months if end of therapy PET/CT shows Deauville 4 or 5 FDG avidity

Background and Supporting Information

Nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL) is a distinct subtype of Hodgkin lymphoma characterized by an indolent clinical course, frequent peripheral lymphadenopathy, and a tendency for late relapses. Similar to other Hodgkin lymphoma subtypes, disease presentation and prognosis are influenced by stage, tumor burden, and clinical risk factors, and accurate staging is essential for treatment selection and monitoring (Borchmann et al., 2021).

Evidence Discussion

The recommendation for PET/CT in initial staging and response assessment is supported by multiple sources demonstrating its high sensitivity for detecting metabolically active Hodgkin lymphoma and its superiority over anatomic imaging alone. PET/CT enables accurate identification of nodal and extranodal disease, improves

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staging accuracy, and frequently upstages disease compared with CT alone, directly influencing treatment stratification and preventing undertreatment (Cheson et al., 2014; Borchmann et al., 2021). Additionally, PET-based response criteria provide standardized assessment of metabolic activity, allowing differentiation between residual viable tumor and fibrosis, which cannot be reliably achieved with CT alone (Cheson et al., 2014).

The use of PET/CT at defined intervals during treatment is supported by evidence showing that interim PET response is highly prognostic and central to response-adapted therapy. Prospective randomized data demonstrate that PET-guided approaches can safely guide treatment de-escalation (e.g., omission of radiotherapy) in patients with favorable metabolic response without compromising progression-free survival, while identifying high-risk patients who may require intensified therapy (Borchmann et al., 2021). This supports the guideline allowance for PET/CT as frequently as every 2 cycles to guide ongoing treatment and confirm metabolic response.

The recommendation to delay PET/CT following radiation therapy is supported by evidence demonstrating significant false-positive rates shortly after treatment due to inflammatory uptake. False-positive findings can lead to unnecessary biopsies, additional imaging, and treatment escalation. Studies report substantial rates of false-positive PET findings and unnecessary invasive procedures when imaging is performed too soon after therapy, reinforcing the requirement for appropriate timing to minimize harm (Picardi et al., 2014).

For evaluation of recurrence, the combined use of CT and PET/CT is supported by the complementary strengths of these modalities. PET/CT is highly sensitive for detecting metabolically active relapse, while CT provides anatomic localization. However, evidence also shows that PET/CT specificity is limited by false positives, particularly in mediastinal or inflammatory processes, resulting in unnecessary biopsies and procedures. This balance supports selective use of PET/CT, particularly ≥3 months after therapy, to improve diagnostic accuracy while minimizing harm (Picardi et al., 2014; Cheson et al., 2014).

Surveillance imaging recommendations reflect a balance between early relapse detection and potential harms of over-imaging. Large observational and multicenter data demonstrate that routine imaging surveillance does not improve overall survival or progression-free survival compared with clinical follow-up. Relapses are frequently detected through clinical symptoms or examination rather than imaging, and routine imaging is associated with increased radiation exposure, cost, and high false-positive rates leading to unnecessary interventions (Bastos Oreiro et al., 2021; Picardi et al., 2014). Although some guideline frameworks (e.g., NCCN) continue to allow limited CT surveillance, the overall evidence supports minimizing imaging and prioritizing clinical monitoring to reduce harm without compromising outcomes.

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Health Equity Considerations

Nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL) is a rare, indolent lymphoma with excellent long-term survival for most patients; however, its rarity and heterogeneity may contribute to inequities in diagnosis, staging, and longitudinal management. Accurate diagnosis requires excisional lymph node biopsy and expert hematopathology review to distinguish NLPHL from classical Hodgkin lymphoma and from biologically related entities such as T-cell/histiocyte-rich large B-cell lymphoma, particularly in patients with variant immunoarchitectural patterns or suspected transformation (Salvaris et al., 2024; Ansell, 2024). Limited access to subspecialty pathology, molecular classification expertise, and advanced imaging may increase the risk of misclassification or delayed diagnosis, potentially resulting in overtreatment, undertreatment, or missed transformation. These challenges may disproportionately affect patients treated in resource-limited settings or outside of academic centers.

Imaging equity is particularly important in NLPHL, as positron emission tomography/computed tomography (PET/CT) plays a central role in accurate staging, assessment of bulky or extranodal disease, and evaluation for relapse or transformation, while also reducing the need for invasive procedures such as routine bone marrow biopsy (Salvaris et al., 2024; Ansell, 2024). Risk-adapted strategies, including active surveillance, de-escalated radiotherapy, and PET-guided treatment approaches, aim to minimize long-term treatment-related toxicity in a population with excellent survival, but require consistent access to high-quality imaging and multidisciplinary expertise (Ansell, 2024; Salvaris et al., 2024). Standardized evidence-based imaging recommendations for NLPHL support equitable application of modern staging and surveillance practices, helping to reduce variability in care and ensuring that patients across diverse care settings can benefit from toxicity-sparing, risk-appropriate management strategies.

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Hematopoietic Stem Cell Transplantation (ONC-29)

Guideline

General Criteria for Stem Cell Transplant (ONC-29.1)
Reference (ONC-29)

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General Criteria for Stem Cell Transplant (ONC-29.1)

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Pre-Transplant Imaging Criteria in Hematopoietic Stem Cell Transplantation (HSCT):

- Pre-transplant imaging in HSCT generally takes place within 30 days prior to transplant and involves a reassessment of the individual's disease status as well as infectious disease clearance.

Indication	Medically Necessary Imaging Study
Immediate pre-transplant period in HSCT	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for ANY of the following: ◦ Any individual prior to undergoing allogeneic transplant ◦ New findings on chest x-ray ◦ New/worsening signs/symptoms of chest involvement • CT Sinus (CPT® 70486) for any clinical signs or symptoms or previous sinus disease • CT of other body areas is not considered medically necessary without clinical signs or symptoms of involvement • For individuals receiving CAR-T, if required by institutional protocol, baseline MRI Brain without and with contrast (CPT® 70553)
Assess cardiac function in HSCT	• Echocardiogram (CPT® 93306, CPT® 93307 or CPT® 93308) ◦ MUGA scan (CPT® 78472) in specific circumstances, see: **Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD) (CD-12.1)** in the Cardiac Imaging Guidelines

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Indication	Medically Necessary Imaging Study
Assess pulmonary function in HSCT	• Pulmonary function tests
Assess primary disease status in HSCT	• See disease-specific guidelines for end of therapy response assessment

Post-Transplant Imaging Criteria in HSCT:

- Disease response generally takes place at ~Day +30 (autos and some allos) or ~Day +100 (allos) post-transplant.

Indication	Medically Necessary Imaging Study
Assess known or suspected HSCT complications	• Site-specific imaging
Suspected hepatic GVHD (elevated liver enzymes)	• Abdominal US (CPT® 76700 or CPT® 76705)
Suspected Bronchiolitis Obliterans Syndrome (BOS)	• CT Chest without contrast (CPT® 71250)
Assess primary disease status post-transplant	• See disease-specific guidelines for end of therapy evaluation and surveillance
Individuals receiving tandem auto transplants (2-4 autos back-to-back, spaced 6 to 8 weeks apart)	• Guideline recommended imaging repeated after each transplant
New neurologic symptoms after CAR-T in individuals with HSCT	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

Hematopoietic stem cell transplantation (HSCT) involves the infusion of hematopoietic stem cells obtained either from the patient (autologous transplant) or a donor (allogeneic transplant) and is used to treat a variety of malignant and non-malignant hematologic conditions. Autologous transplantation is primarily utilized as a rescue following high-dose chemotherapy, while allogeneic transplantation replaces the recipient immune

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system and is associated with a significantly greater degree of immunosuppression and prolonged immune reconstitution (Chan et al., 2023).

In an allogenic ("allo") transplant, the donor and recipient are different people, and there are multiple types depending on the source of the stem cells and degree of match between donor and recipient. This is most commonly used in diseases originating in the hematopoietic system, such as leukemias and lymphomas, and bone marrow failure syndromes or metabolic disorders. Common types are:

- Matched sibling donor (MSD or MRD): Donor and recipient are full siblings and HLA-matched.
- Matched unrelated donor (MUD): Donor and recipient are HLA matched but not related to each other.
- Cord blood: Donor stem cells come from frozen umbilical cord blood not related to the recipient, sometimes from multiple different donors at once.
- Haploidentical transplant (haplo): Donor is a half-HLA match to the recipient, usually a parent.

In an autologous ("auto") transplant, the donor and recipient are the same person. The process involves delivery of high dose chemotherapy that is ablative to the bone marrow, followed by an infusion of one's own harvested stem cells. Allogeneic HSCT results in a much greater degree of immunosuppression than autologous HSCT because of the need to allow the new immune system to chimerize with the recipient's body. Immune reconstitution commonly takes more than a year for individuals who receive allogeneic HSCT, and individuals remain at high-risk for invasive infections until that has occurred (NCCN, 2026).

HSCT recipients are at high risk for complications involving multiple organ systems, particularly due to prolonged immunosuppression. Common complications include pulmonary infections, hepatic veno-occlusive disease, GVHD, and central nervous system abnormalities, all of which require targeted, site-specific imaging approaches rather than routine screening (Chan et al., 2023).

Evidence Discussion

The recommendation to limit pre-transplant imaging to clinically indicated studies is supported by NCCN guidance, which does not endorse routine imaging for infection screening in asymptomatic individuals and instead emphasizes targeted evaluation based on symptoms and clinical findings (NCCN, 2026). This is further supported by evidence demonstrating that screening sinus CT does not influence clinical management or predict post-transplant infectious outcomes. In a cohort of pediatric HSCT candidates, pre-transplant sinus CT findings were not associated with changes in therapy, transplantation timing, or development of post-transplant sinus disease, indicating limited clinical utility despite frequent imaging abnormalities (Harreld et al., 2020).

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Similarly, restriction of CT imaging of other body regions without clinical indication is supported by NCCN and corroborated by evidence showing that routine CT screening of abdomen and pelvis rarely changes management and adds unnecessary radiation exposure and cost. Consensus recommendations emphasize that imaging should be symptom-driven, as routine screening in asymptomatic individuals does not improve outcomes and may lead to incidental findings and unnecessary interventions (Chan et al., 2023; NCCN, 2026).

The recommendation for baseline cardiac assessment with echocardiography is supported by evidence and consensus guidelines demonstrating that evaluation of left ventricular function is essential prior to exposure to potentially cardiotoxic conditioning regimens. Echocardiography is the preferred modality due to its safety, lack of radiation, reproducibility, and ability to support serial monitoring of cardiac function in oncology populations, ensuring appropriate dosing and minimizing risk of treatment-related cardiac dysfunction (Plana et al., 2014).

Post-transplant imaging recommendations are supported by NCCN principles and evidence indicating that HSCT complications are heterogeneous and organ-specific, requiring targeted imaging strategies. Imaging is most effective when directed by clinical suspicion, as complications such as infection, graft-versus-host disease, bronchiolitis obliterans, and hepatic dysfunction require modality-specific evaluation. This site-specific approach maximizes diagnostic accuracy and facilitates early intervention while avoiding harms associated with unnecessary imaging (Chan et al., 2023; NCCN, 2026).

Health Equity Considerations

Hematopoietic stem cell transplantation (HSCT) is a potentially curative but highly complex, resource-intensive therapy, and substantial inequities persist across the transplant continuum, including referral, evaluation, donor availability, utilization, and post-transplant outcomes. Large registry and population-based analyses consistently demonstrate that racial and ethnic minority patients, individuals with public insurance, and those residing in lower-income or lower-education neighborhoods are significantly less likely to receive allogeneic HSCT, even when clinically eligible (Kang et al., 2026; Kumar et al., 2024; Landry, 2021). Structural barriers, including delayed referral from community settings, geographic distance from transplant centers, variable insurance coverage, and underrepresentation of minority donors in registries, contribute to disproportionate access and prolonged time to transplant among Black, Hispanic, and socioeconomically disadvantaged patients (Kumar et al., 2024; Landry, 2021). Recent data indicate that, despite expanded donor options such as haploidentical and cord blood transplantation, disparities in HSCT utilization have not meaningfully narrowed over time and, in some settings, continue to widen (Kang et al., 2026).

Beyond access, social determinants of health substantially influence transplant outcomes. Multiple studies demonstrate that lower socioeconomic status, adverse

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neighborhood conditions, communication barriers, financial hardship, and limited caregiver support independently predict worse survival, higher nonrelapse mortality, increased graft-versus-host disease, and infection-related deaths following allogeneic HSCT (Huguet et al., 2026; Garcia et al., 22024; Kumar et al., 2024). Psychosocial eligibility assessments, while intended to optimize safety, may unintentionally disadvantage lower-income patients, as socioeconomic status is strongly associated with unfavorable psychosocial scores and reduced likelihood of proceeding to transplant (Shoag et al., 2024; Garcia et al., 2024). Equitable access to standardized, evidence-based imaging for pre-transplant evaluation, response assessment, and post-transplant surveillance supports consistent risk stratification and early detection of complications across care settings. Integrating imaging recommendations with multidisciplinary, socially informed care pathways may help mitigate inequities by reducing variability in transplant decision-making, avoiding unnecessary delays, and supporting optimal outcomes for historically underserved populations (Blue et al., 2023; Melo et al., 2025).

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Medical Conditions with Cancer in the Differential Diagnosis (ONC-30)

Guideline

Fever of Unknown Origin (FUO) (ONC-30.1)
Unexplained Weight Loss (ONC-30.2)
Paraneoplastic Syndromes (ONC-30.3)
References (ONC-30)

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Fever of Unknown Origin (FUO) (ONC-30.1)

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Criteria

Indication	Medically Necessary Imaging Study
If physical examination, chest x-ray, and laboratory studies are non-diagnostic in individuals with FUO	• Echocardiogram (CPT® 93306) • Abdominal ultrasound (CPT® 76700) • MRI Brain without and with contrast (CPT® 70553)
Above studies (including PE/ENT exam, pelvic exam, and DRE with laboratory studies) have failed to demonstrate site of infection in individuals with FUO	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s): CPT® 78800, CPT® 78801, or CPT® 78802, CPT® 78804, CPT® 78803 or CPT® 78831 (SPECT), or CPT® 78830, or CPT® 78832 (SPECT/CT)
"B" symptoms in individuals with FUO	• See: **Non-Hodgkin Lymphomas (ONC-27)**
Any CNS sign/symptom accompanied by fever in individuals with FUO	• MRI Brain without and with contrast (CPT® 70553)
All individuals with FUO	• PET is not considered medically necessary in the work-up of individuals with FUO

Background and Supporting Information

Fever of unknown origin (FUO) is defined as a persistent fever ≥38.3°C (101°F) lasting at least 3 weeks without an identified cause after appropriate initial evaluation. Despite advances in diagnostic testing, FUO remains a challenging clinical entity, with no diagnosis established in a substantial proportion of patients. The major etiologic categories include infection, malignancy, noninfectious inflammatory disease, and miscellaneous causes, with infection remaining the most common and malignancy accounting for approximately 20%–30% of cases (Haidar & Singh, 2022; Palestro et al., 2023; Minamimoto, 2022). While fever is a classic "B" symptom of advanced lymphoma,

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a cancer-related fever presenting in isolation without any other signs or symptoms of neoplastic disease is rare.

Evidence Discussion

The recommendation for initial use of echocardiography, abdominal ultrasound, and MRI brain following nondiagnostic clinical evaluation is supported by evidence demonstrating that infectious etiologies, including endocarditis, intra-abdominal abscess, and central nervous system infections, are the most common causes of FUO. These modalities provide high diagnostic sensitivity (approximately 80%–86% in aggregate across studies) and are favored due to their ability to evaluate common etiologies without exposing patients to ionizing radiation. This aligns with structured diagnostic approaches emphasizing targeted, low-risk imaging early in the workup (Haidar & Singh, 2022; Wright et al., 2024; Mulders-Manders et al., 2021).

The use of contrast-enhanced CT of the chest, abdomen, and pelvis as second-line imaging is supported by its ability to identify occult malignancy, abscess, and inflammatory disease when first-line studies are unrevealing. CT provides comprehensive anatomic detail with reported sensitivity approaching 90% and moderate specificity for determining the cause of FUO. However, its use is appropriately delayed until after lower-risk modalities due to radiation exposure and lower diagnostic yield when used indiscriminately in early evaluation (Minamimoto, 2022; Haidar & Singh, 2022).

Radiopharmaceutical localization studies, including technetium-based scans and SPECT/SPECT-CT, are supported for persistent diagnostic uncertainty due to their high specificity (approximately 93%–94%) in localizing infectious or inflammatory foci. However, these modalities are limited by lower sensitivity, longer imaging times, and reduced availability, supporting their role as adjunctive tools rather than first-line imaging (Palestro et al., 2023; Minamimoto, 2022).

The recommendation against routine PET/CT in FUO reflects a critical balance between diagnostic benefit and potential harm. Although FDG PET/CT demonstrates high sensitivity (approximately 84%–86%) and can contribute to diagnosis in up to 50%–60% of cases, its specificity is limited (approximately 52%–63%), resulting in a significant rate of false-positive findings due to nonspecific uptake (Kan et al., 2019; Palestro et al., 2023; Minamimoto, 2022). This can lead to unnecessary invasive procedures, additional imaging, increased cost, and patient anxiety. Furthermore, while FDG PET/CT may improve diagnostic efficiency and reduce time to diagnosis in selected cases, evidence suggests that its optimal role is as a second-line or problem-solving modality after conventional evaluation rather than routine first-line imaging. Early use may reduce hospitalization and cost in select populations, but variability in specificity and the lack of consensus regarding its placement in diagnostic algorithms support its exclusion as medically necessary in standard FUO workup (Palestro et al., 2023; Minamimoto, 2022).

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Finally, evidence demonstrates that negative FDG PET/CT findings are frequently associated with favorable outcomes and spontaneous resolution of fever, reinforcing that aggressive imaging is not always required in the absence of clinical deterioration. This supports a conservative, stepwise imaging strategy that prioritizes clinically indicated modalities and minimizes unnecessary radiation exposure and downstream interventions while maintaining diagnostic accuracy (Mulders-Manders et al., 2021; Palestro et al., 2023).

Health Equity Considerations

Fever of unknown origin (FUO) poses distinct health equity challenges because its diagnosis depends heavily on access to prolonged hospitalization, advanced laboratory testing, and high-yield imaging modalities. Contemporary studies demonstrate that FUO populations are disproportionately older, multimorbid, and affected by malignancy or immunosuppression, all of which are more prevalent among individuals with lower socioeconomic status and reduced access to longitudinal specialty care (De Pascali et al., 2025; Kaya et al., 2025). Diagnostic yield varies substantially by geography and healthcare setting, with infectious etiologies predominating in lower-resource regions and non-infectious inflammatory diseases and malignancies more common in tertiary centers in high-income countries, reflecting structural differences in access to imaging, subspecialty consultation, and invasive diagnostics (Kaya et al., 2025). Seasonal clustering related to vector-borne diseases and emerging infections further underscores the importance of equitable public health surveillance and geographically informed diagnostic strategies, particularly for populations with limited access to preventive care and timely evaluation (De Pascali et al., 2025).

Imaging plays a central role in reducing inequities in FUO evaluation when applied consistently and judiciously. Advanced imaging, particularly FDG PET/CT, has the highest diagnostic yield for malignancy and deep-seated infection, shortens time to diagnosis, and may reduce prolonged hospitalization when incorporated into structured, stepwise algorithms (Kaya et al., 2025). However, unequal access to PET/CT and subspecialty imaging can contribute to delayed diagnosis, excess empiric antibiotic use, and poorer outcomes among underserved patients, including older adults, people living with HIV, and those receiving immunosuppressive therapy (De Pascali et al., 2025; Kaya et al., 2025). Standardized, evidence-based imaging pathways for FUO can help mitigate these disparities by promoting timely escalation to high-yield imaging when clinically appropriate, minimizing unnecessary testing, and supporting equitable diagnostic evaluation across diverse care settings and populations.

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Unexplained Weight Loss (ONC-30.2)

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Criteria

- Initial workup for all individuals may include appropriate detailed history, physical exam, baseline laboratory studies (e.g., CBC, CMP, HgbA1c, ESR/CRP, infectious workup, stool hemoccult, endocrine evaluation to rule out thyroid, pituitary, or gonadal dysfunction, etc.), chest x-ray, age-appropriate cancer screening, and neurological evaluation to rule out depression/dementia.
- Additional workup is directed to evaluate specific signs, symptoms, red flags, or abnormalities detected on initial workup. See condition-specific imaging guidelines for additional details.
- PET is not considered medically necessary in the work-up of individuals with unexplained weight loss.
- Being on a GLP-1 does not preclude a workup for unexplained weight loss. If provider believes the individual's weight loss is not fully explained by the GLP-1, these guidelines should be used to guide imaging as for all other individuals.

Indication	Medically Necessary Imaging Study
CNS symptoms or abnormal pituitary hormones in individuals with unexplained weight loss	• MRI Brain or Sella Turcica without and with contrast (CPT® 70553)
Abnormal thyroid function in individuals with unexplained weight loss	• Thyroid ultrasound (CPT® 76536)
Abnormal liver function in individuals with unexplained weight loss	• Abdominal ultrasound (CPT® 76700)
Abnormal kidney function in individuals with unexplained weight loss	• Ultrasound Kidney and Bladder (CPT® 76770 or CPT® 76775)
Suspected cardiac dysfunction in individuals with unexplained weight loss	• Echocardiogram (CPT® 93306)

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Indication	Medically Necessary Imaging Study
Non-smokers with unexplained weight loss	• Chest x-ray ◦ CT Chest with contrast (CPT® 71260) to evaluate abnormalities on chest x-ray
Current or former smokers with unexplained weight loss	• CT Chest with contrast (CPT® 71260)
Dysphagia or early satiety in individuals with unexplained weight loss	See: **Dysphagia and Esophageal Disorders (NECK-3)**
GI bleeding in individuals with unexplained weight loss	See: **GI Bleeding (AB-22)**
Abdominal pain without red flag signs in individuals with unexplained weight loss	See: **Abdominal Pain (AB-2)**
Suspected pancreatic cancer in individuals aged ≥60 years with weight loss and at least one of the following: • Diarrhea • Back pain • Abdominal pain • Nausea/vomiting • Constipation • New onset diabetes • Abnormal labs (CA 19-9, LFTs) • Non-diagnostic or negative abdominal ultrasound	Any ONE of the following: • CT Abdomen with contrast (CPT® 74160) • CT Abdomen and Pelvis with contrast (CPT® 74177) • MRI Abdomen without and with contrast (CPT® 74183) See also: **Abdominal Pain (AB-2)**
If all of the above do not identify cause of weight loss	Any of the following, if not previously performed: • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis (CPT® 74177) with contrast

Background and Supporting Information

Unintentional (unexplained) weight loss is generally defined as loss of ≥5% of body weight over 6 months or less without an identifiable reason and is associated with increased morbidity and mortality, particularly in older adults (Gaddey & Holder,

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2021; Durmuş et al., 2022; Metalidis et al., 2008). Weight loss is a nonspecific but clinically important presentation with a broad differential diagnosis including malignancy, nonmalignant organic disease, and psychiatric etiologies, with nonmalignant causes accounting for the majority of cases (Bosch et al., 2017; Nicholson et al., 2018; Metalidis et al., 2008).

Malignancy is identified in a minority of individuals with unexplained weight loss, generally ranging from approximately 20% to 30%, and is most commonly associated with gastrointestinal, lung, and hematologic cancers (Nicholson et al., 2018; Bosch et al., 2017; Metalidis et al., 2008). Psychiatric causes, particularly major depressive disorder, are also common and may present primarily with weight loss in older adults, often without overt mood symptoms (Durmuş et al., 2022; Gaddey & Holder, 2021).

Weight loss is also recognized as a nonspecific symptom that may be associated with multiple cancer types but with relatively low predictive value when present in isolation. Risk-based diagnostic strategies therefore apply thresholds of suspicion to guide further investigation, balancing earlier detection with potential harms of over-investigation such as radiation exposure, incidental findings, and unnecessary procedures (National Collaborating Centre for Cancer, 2015; Nicholson et al., 2018).

Evidence Discussion

The recommendation to begin with symptom-directed evaluation and baseline testing prior to advanced imaging is supported by evidence demonstrating that most serious underlying causes of unexplained weight loss can be identified through initial clinical assessment. Prospective data show that all individuals with malignancy had abnormalities on baseline evaluation, including physical examination, laboratory studies, chest x-ray, or abdominal ultrasound, indicating high sensitivity of initial workup for clinically significant disease (Metalidis et al., 2008). This supports restricting early imaging to findings-driven evaluation rather than routine advanced imaging.

The use of targeted first-line imaging based on specific abnormalities (e.g., thyroid ultrasound, abdominal ultrasound, renal ultrasound, echocardiography, or MRI brain) is supported by the heterogeneous etiologies of weight loss. Organic diseases affecting endocrine, gastrointestinal, renal, and cardiopulmonary systems are frequently identified and are best evaluated using modality-specific imaging guided by clinical or laboratory abnormalities (Gaddey & Holder, 2021; Durmuş et al., 2022; Bosch et al., 2017). This approach improves diagnostic yield and avoids unnecessary radiation exposure and over-imaging.

Escalation to CT imaging of the chest, abdomen, and pelvis when baseline evaluation is negative but clinically significant weight loss persists is supported by evidence demonstrating that a subset of malignancies may be detected only on advanced imaging. While a normal baseline evaluation substantially lowers the likelihood of malignancy, additional imaging may identify cancers such as lung, pancreatic,

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colorectal, and lymphoma in selected patients, particularly those with persistent or progressive symptoms (Nicholson et al., 2018; Bosch et al., 2017; Metalidis et al., 2008).

Risk-based imaging strategies, including CT chest for smokers and abdominal imaging for individuals with features concerning for pancreatic cancer, are supported by predictive modeling and cancer diagnostic frameworks. Clinical guidance emphasizes the use of symptom combinations and risk factors (e.g., age, smoking status) to refine cancer probability, ensuring that imaging is directed toward higher-risk populations while minimizing unnecessary testing in low-risk individuals (NCCC, 2015; Nicholson et al., 2018).

The recommendation against routine PET/CT is supported by the absence of evidence demonstrating diagnostic accuracy or clinical benefit in unexplained weight loss. No prospective data define sensitivity or specificity of PET in this population, and its use can lead to false-positive findings, incidental uptake, and unnecessary invasive procedures. Case-based evidence further demonstrates that PET/CT findings may reflect nonmalignant or psychiatric etiologies, resulting in additional testing without improving outcomes (Durmuş et al., 2022; Gaddey & Holder, 2021).

Health Equity Considerations

Unintentional weight loss (UWL) presents important equity challenges because recognition, evaluation, and follow-up are strongly influenced by age, gender, socioeconomic status, and patterns of healthcare engagement. UWL is frequently under-recognized in primary care, with fewer than one quarter of cases documented by clinicians, even though it may represent an early or isolated manifestation of malignancy or other serious disease (Rao et al., 2023). Evidence from large primary-care cohorts demonstrates that while the absolute risk of cancer associated with UWL is modest, it varies meaningfully by age and sex, and is highest among older adults, particularly men, underscoring the need for equitable access to timely diagnostic evaluation rather than reliance on symptom severity alone (Withrow et al., 2022). Missed or delayed recognition disproportionately affects individuals with fewer healthcare encounters, fragmented continuity of care, or competing social stressors, increasing the risk that medically significant weight loss is normalized or attributed to aging, lifestyle, or psychosocial factors without appropriate evaluation.

Socioeconomic disadvantage further shapes how patients perceive weight loss and how clinicians respond to it. Qualitative evidence shows that older adults from more deprived backgrounds are less likely to raise concerns about unintentional weight loss, more likely to internalize stigma or view weight loss as desirable or inevitable, and less empowered to challenge clinical reassurance or request further assessment (Newton-Clarke et al., 2025). These dynamics contribute to structural inequities in diagnostic pathways, particularly for imaging-based cancer evaluation, where earlier escalation may depend on patient advocacy or clinician suspicion. Standardized imaging

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criteria for UWL can help reduce variation driven by implicit bias, communication disparities, and resource access by supporting consistent decision-making across populations. Applying evidence-based imaging pathways when clinically indicated helps ensure that patients with unintentional weight loss, regardless of socioeconomic status, age, or prior body weight, receive equitable evaluation for potential malignancy while minimizing unnecessary testing and delays.

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Paraneoplastic Syndromes (ONC-30.3)

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Criteria

- The following are the most common symptoms of paraneoplastic syndromes known to arise from various malignancies:
  - Hypertrophic Pulmonary Osteoarthropathy: Often presents as a constellation of rheumatoid-like polyarthritis, periostitis of long bones, and clubbing of fingers and toes
  - Amyloidosis
  - Hypercalcemia
  - Hypophosphatemia
  - Cushing's Syndrome
  - Somatostatinoma syndrome (vomiting, abdominal pain, diarrhea, cholelithiasis)
  - Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
  - Polymyositis/dermatomyositis
  - Opsoclonus
  - Paraneoplastic sensory neuropathy
  - Subacute cerebellar degeneration
  - Eaton-Lambert syndrome (a myasthenia-like syndrome)
  - Second event of unprovoked thrombosis
  - Disseminated Intravascular Coagulation
  - Migratory thrombophlebitis
  - Polycythemia
  - Chronic leukocytosis and/or thrombocytosis
  - Elevated tumor markers (including but not limited to: CEA, CA 19-9, CA 27-9, CA 15-3, CA 125, inhibin A and B, AFP, unexplained HCG)
  - Cryptogenic stroke (see also: **HD-21.3)**
- See: **Muscle Disorders (PN-6)** in the Peripheral Nerve Disorders Imaging Guidelines.
- See: **Multiple Myeloma and Plasmacytomas (ONC-25)** for evaluation of possible multiple myeloma.
- See: **Abnormal Non-Invasive Prenatal Testing (NIPT) and Maternal Malignancy (PV-15.5)** in the Pelvis Imaging Guidelines for NIPT Paraneoplastic syndromes.

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Indication	Medically Necessary Imaging Study
Initial evaluation of paraneoplastic syndromes	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast
ANY of the following in individuals with paraneoplastic syndromes: • Abnormality on conventional imaging difficult to biopsy • Inconclusive conventional imaging • Documented paraneoplastic antibody and conventional imaging fails to demonstrate primary site	• PET/CT (CPT® 78815 or CPT® 78816)
Subsequent evaluation for known paraneoplastic syndrome	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast every 6 months for 2 years after initial imaging for Lambert-Eaton Myasthenia syndrome • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast every 6 months for 4 years for all other paraneoplastic syndromes
Systemic mastocytosis in individuals with paraneoplastic syndromes	ANY ONE of the following: • CT Abdomen and Pelvis (CPT® 74177) with contrast • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • PET/CT scan is not considered medically necessary for evaluation of mastocytosis
First episode of unprovoked DVT/ VTE in individuals with paraneoplastic syndromes	• Imaging to evaluate for malignancy is not considered medically necessary

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Indication	Medically Necessary Imaging Study
Second unprovoked DVT/PE in individuals with paraneoplastic syndromes	• Imaging may be considered in the setting of a negative work-up for inherited thrombophilia and antiphospholipid syndrome
Thyroid US is considered medically necessary for elevated CEA.	

Background and Supporting Information

Paraneoplastic syndromes (PNS) are clinical disorders caused by malignancy-related immune or humoral mechanisms and are not due to direct tumor invasion, metastasis, or treatment effects (Badawy et al., 2023). These syndromes frequently affect neurologic, endocrine, hematologic, and metabolic systems and may precede detection of an underlying malignancy, sometimes by months to years, creating a diagnostic interval during which imaging may initially be negative (Badawy et al., 2023; Sundermann et al., 2017).

Paraneoplastic neurologic syndromes are strongly associated with specific malignancies, particularly small cell lung cancer, and are often linked to the presence of onconeural antibodies, which increase the likelihood of identifying an underlying tumor (Sundermann et al., 2017). Tumors associated with PNS are frequently small, clinically occult, or suppressed by immune mechanisms, which contributes to difficulty in detection and underscores the need for sensitive imaging strategies (Sundermann et al., 2017).

Evidence Discussion

The use of contrast-enhanced CT of the chest, abdomen, and pelvis as first-line imaging is supported by its ability to evaluate the most common sites of malignancy associated with paraneoplastic syndromes, particularly thoracic and abdominal tumors such as small cell lung cancer (Sundermann et al., 2017; Badawy et al., 2023). Reported sensitivity of CT in this setting ranges from approximately 30% to 82%, with specificity between 71% and 100%, demonstrating moderate-to-high diagnostic accuracy while providing necessary anatomic detail for lesion characterization and biopsy planning (Sundermann et al., 2017). This supports CT as the preferred initial modality balancing diagnostic yield and accessibility.

PET/CT is appropriately reserved for cases with inconclusive conventional imaging, inaccessible lesions, or documented paraneoplastic antibodies, as its diagnostic performance improves in higher-risk populations (Sundermann et al., 2017). FDG PET/CT demonstrates sensitivity ranging from approximately 75% to 100% with variable

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specificity, and pooled analyses report tumor detection in approximately 23%–24% of patients with suspected paraneoplastic syndromes (Sundermann et al., 2017). These findings support its role as a second-line or problem-solving modality capable of identifying metabolically active lesions and alternative biopsy sites when CT is nondiagnostic. However, PET/CT is not recommended as first-line imaging due to important limitations, including false-negative findings in small or low-metabolic tumors and false-positive uptake in inflammatory or physiologic processes (Sundermann et al., 2017; Badawy et al., 2023). False positives commonly occur in areas such as lymph nodes, gastrointestinal tract, and inflammatory lung disease, while false negatives may occur in breast, gastrointestinal, hepatic, and head and neck malignancies (Sundermann et al., 2017). These limitations increase the risk of unnecessary invasive procedures and support a stepwise imaging approach beginning with CT.

The recommendation for serial CT imaging in patients with suspected or confirmed paraneoplastic syndromes is supported by evidence that malignancy may emerge after initial negative imaging, with documented cases of delayed tumor detection months to years after symptom onset (Sundermann et al., 2017; Badawy et al., 2023). This supports periodic surveillance imaging, particularly within the first several years, when the probability of tumor detection remains clinically meaningful.

For systemic mastocytosis, cross-sectional imaging with CT or MRI of the abdomen and pelvis is supported by NCCN recommendations for evaluation of organ involvement, including liver, spleen, lymph nodes, and bone (NCCN, 2026). PET/CT is not recommended in this context due to lack of established diagnostic benefit, reinforcing modality selection based on expected disease distribution and imaging utility (NCCN, 2026).

Finally, the approach to imaging in venous thromboembolism within the context of paraneoplastic syndromes reflects a risk-based strategy. Evidence demonstrates that extensive imaging following a first unprovoked event has low diagnostic yield and is not cost-effective in the absence of additional clinical indicators of malignancy, whereas a second unprovoked event increases suspicion and justifies cross-sectional imaging (Rutherford et al., 2007; Harlos et al., 2019). This approach balances early cancer detection with avoidance of unnecessary imaging and associated harms.

Health Equity Considerations

Paraneoplastic syndromes (PNS) present substantial equity challenges because they are rare, clinically heterogeneous, and frequently precede the diagnosis of an underlying malignancy, making early recognition highly dependent on clinician awareness, access to specialty care, and availability of advanced diagnostic resources. Population-based data demonstrate that PNS carry a disproportionately high burden of morbidity and mortality relative to their low incidence, with significant disability-adjusted life years attributable largely to delayed diagnosis and neurologic impairment (Shah et al., 2021).

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These challenges are magnified for patients facing structural barriers to care, including limited access to neurologic subspecialists, autoantibody testing, or timely oncologic imaging, which can delay tumor identification and definitive treatment. As recognition of PNS has increased with improved serologic assays and expanded diagnostic criteria, disparities may widen if such tools are not equitably accessible across healthcare settings (Shah et al., 2021).

Health equity considerations are particularly salient for cutaneous paraneoplastic syndromes in individuals with skin of color, where pigment-modified presentations can obscure classic diagnostic features and contribute to missed or delayed cancer detection. Evidence shows that paraneoplastic dermatoses such as dermatomyositis and malignant acanthosis nigricans often appear atypically in darker skin tones, and underrepresentation of skin of color in medical education further compounds diagnostic inequities (Wahab et al., 2025). These delays have measurable oncologic consequences, including more advanced cancer stage at presentation and poorer outcomes. Standardized imaging pathways informed by paraneoplastic suspicion, rather than reliance on stereotypical clinical appearances, can help mitigate bias and variability in care. Ensuring equitable thresholds for diagnostic escalation, including early tumor-directed imaging when PNS is suspected, supports timely cancer detection across diverse populations and helps reduce disparities driven by diagnostic invisibility and uneven access to specialty expertise (Shah et al., 2021; Wahab et al., 2025).

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Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer (ONC-31)

Guideline

General Criteria (ONC-31.0)
Lung Metastases (ONC-31.1)
Liver Metastases and Liver-Directed Therapies (ONC-31.2)
Brain Metastases (ONC-31.3)
Adrenal Gland Metastases (ONC-31.4)
Bone (Non-Vertebral) Metastases (ONC-31.5)
Spinal/Vertebral Metastases (ONC-31.6)
Carcinoma of Unknown Primary Site (ONC-31.7)
Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)
Primary Peritoneal Mesothelioma (ONC-31.9)
Kaposi's Sarcoma (ONC-31.10)
Castleman's Disease (Unicentric and Multicentric) (ONC-31.11)
References (ONC-31)

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General Criteria (ONC-31.0)

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- Guideline sections Lung Metastases (ONC-31.1) through Spinal Vertebral Metastases (ONC-31.6) are designed to supplement the disease-specific guidelines when the disease-specific guidelines do not provide guidance on the clinical scenario in question.
- These sections can also be used if the cancer type is rare and does not have its own diagnosis-specific imaging guidelines.
- These sections may also be used for lesions suspicious for cancer that do not have guidance in other disease-specific areas of the guidelines.

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Lung Metastases (ONC-31.1)

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Criteria

Indication	Medically Necessary Imaging Study
New or worsening signs or symptoms suggestive of metastatic lung involvement or new or worsening chest x-ray abnormality	• CT Chest with contrast (CPT® 71260) • CT Chest without contrast (CPT® 71250) if there is a contraindication to CT contrast or only parenchymal lesions are being evaluated
Chest wall or brachial plexus involvement	• MRI Chest without and with contrast (CPT® 71552)
ONE of the following **and** no diagnosis-specific guideline regarding PET imaging: • Lung nodule(s) 8mm or greater • Confirm solitary metastasis amenable to resection on conventional imaging	• PET/CT (CPT® 78815) • When primary cancer known, PET request should be reviewed by primary cancer guideline
Previous or current malignancy and pulmonary nodule(s) that would reasonably metastasize to the lungs	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) at 3, 6, 12, and 24 months from the first study • For subsolid nodules, ongoing surveillance after 24 months is considered medically necessary. Refer to **Incidental Pulmonary Nodules Detected on CT Images (CH-16.2)** for follow-up for subsolid nodules after the 24 month timeframe.

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Indication	Medically Necessary Imaging Study
Suspected drug-induced or radiation-induced pulmonary toxicity	CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for the following: • Initial evaluation • Repeat imaging at the timing of the discretion of the treating provider ◦ Worsening symptoms or PFTs ◦ Guide for steroid taper ◦ Baseline prior to re-exposure to offending agent

Background and Supporting Information

Pulmonary metastases represent hematogenous dissemination of malignancy to the lungs and most commonly manifest as single or multiple pulmonary nodules with variable size, number, and distribution on imaging (Szaro et al., 2021; Christensen et al., 2024). Metastatic nodules are frequently located in the lung periphery and may demonstrate a wide size range, with multiplicity and lower lobe predominance often suggesting metastatic disease rather than primary lung malignancy (MacMahon et al., 2017; Szaro et al., 2021).

Risk stratification of pulmonary nodules is primarily based on imaging characteristics, including size, growth, and morphology, with increasing size strongly associated with increased probability of malignancy (MacMahon et al., 2017; Christensen et al., 2024). Nodules ≥8mm are associated with a higher likelihood of malignancy and warrant further diagnostic evaluation, including advanced imaging or tissue sampling depending on clinical context (MacMahon et al., 2017; Christensen et al., 2024). In patients with known malignancy, pulmonary nodules are more likely to represent metastatic disease, although benign etiologies such as infection or inflammatory processes remain in the differential (Szaro et al., 2021; Christensen et al., 2024).

Growth kinetics are a critical determinant of malignancy, as most malignant pulmonary nodules demonstrate measurable growth over time, with metastases often showing interval progression within months (MacMahon et al., 2017; Szaro et al., 2021). Stability of a nodule over an extended interval significantly reduces the likelihood of malignancy, with data supporting that nodules stable for greater than 24 months are unlikely to represent active cancer in most clinical scenarios (MacMahon et al., 2017; Christensen et al., 2024).

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Evidence Discussion

CT of the chest is supported as the initial imaging modality in individuals with suspected pulmonary metastases due to its high sensitivity for detecting pulmonary nodules and ability to evaluate both lung parenchyma and mediastinal structures (Szaro et al., 2021; Christensen et al., 2024). Contrast-enhanced CT improves assessment of mediastinal lymph nodes and soft tissue structures, while noncontrast CT remains appropriate when evaluating isolated parenchymal lesions or when contrast is contraindicated (Szaro et al., 2021). This approach balances diagnostic accuracy with patient safety by limiting unnecessary contrast exposure while maintaining high detection capability for metastatic disease.

Serial CT imaging for pulmonary nodules in patients with known or suspected malignancy is supported by evidence demonstrating that growth over time is a key indicator of malignancy, whereas stability over prolonged intervals strongly suggests benign disease (MacMahon et al., 2017; Christensen et al., 2024). Recommended follow-up intervals derived from nodule management data demonstrate that most malignant nodules will show growth within 3–24 months, supporting structured surveillance strategies such as imaging at 3, 6, 12, and 24 months when disease-specific guidance is not otherwise defined (MacMahon et al., 2017; Szaro et al., 2021). This strategy minimizes missed diagnoses while avoiding excessive imaging in nodules that remain stable.

MRI is supported for evaluation of suspected chest wall or brachial plexus involvement because of its superior soft tissue contrast resolution compared with CT, allowing more accurate delineation of tumor infiltration into adjacent structures (Szaro et al., 2021). Accurate characterization of local invasion is essential for staging and treatment planning, particularly when surgical resection is being considered, and CT alone may be insufficient for evaluating complex soft tissue involvement.

Selective use of PET/CT is supported for nodules ≥8mm or when confirming a solitary metastasis amenable to resection, as metabolic imaging improves detection of occult metastatic disease and reduces the risk of futile invasive procedures (Christensen et al., 2024; Szaro et al., 2021). However, routine PET/CT surveillance is not supported due to limitations including false-positive findings from inflammatory processes, false negatives in small or low-metabolic lesions, increased radiation exposure, and cost considerations (Christensen et al., 2024; Szaro et al., 2021). Restricting PET/CT to higher-risk scenarios aligns diagnostic benefit with potential harms and supports a stepwise, risk-adapted imaging approach.

Health Equity Considerations

Lung metastases represent a substantial and growing public health burden, with population-level data demonstrating that approximately 4% of all newly diagnosed cancer cases in the United States present with synchronous lung metastases and that

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this proportion has increased over time, largely reflecting advances in imaging and stage migration (Chen et al., 2021). These trends raise important equity concerns, as detection of lung metastases is highly dependent on access to timely, high-quality cross-sectional imaging and consistent staging practices. Population-based analyses show that patients presenting with lung metastases are more likely to be older, male, and from racialized groups, and to have more advanced primary tumor and nodal stage at diagnosis, suggesting that delayed cancer detection and downstream inequities in access to screening and early diagnostic services contribute to more advanced metastatic presentation in vulnerable populations (Chen et al., 2021). Because the presence of lung metastases is independently associated with worse overall survival across most primary cancer sites, delayed or uneven access to staging imaging may directly exacerbate outcome disparities.

Equitable application of oncologic imaging is therefore central to reducing disparities in outcomes related to lung metastases. Evidence demonstrates that synchronous lung metastases confer significantly poorer survival compared with extrapulmonary metastases alone, even after adjustment for age, sex, race, stage, and the presence of other metastatic sites (Chen et al., 2021). Standardized, evidence-based recommendations for thoracic imaging help mitigate variability driven by healthcare access, referral patterns, or implicit bias by ensuring that patients with high-risk primary tumors receive appropriate evaluation regardless of demographic factors. Consistent adherence to guideline-directed imaging pathways supports earlier identification of lung metastases, more accurate prognostication, and timely initiation of systemic or local therapies, thereby promoting more equitable cancer care across diverse patient populations (Chen et al., 2021).

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Liver Metastases and Liver-Directed Therapies (ONC-31.2)

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Criteria

- Yitrium-90 Radioembolization (Y90-RE) is also known either as Selective Internal Radiation Therapy (SIRT) or trans-arterial radioembolization (TARE). Y90-RE is considered medically necessary for inoperable hepatocellular carcinoma and metastatic disease to the liver. Yitrium-90 resin or glass microsphere is injected into the hepatic vessel which supplies the tumor bed. This delivers high radiation dose to the tumor selectively.
- Yitrium-90 Radioembolization consists of three parts:

1. The pre-treatment planning angiogram with Technetium 99m macroaggregated albumin (Tc-MAA). The Tc-MAA acts as surrogate for biodistribution of application of Y-90. Planar or SPECT/CT are performed for calculation of lung shunt fraction and identification of extra hepatic uptake. The assessment of hepatopulmonary shunt is important in the determination eventual radiation dose. Presence of extra-hepatic uptake may preclude treatment or require coil embolization.
2. Yitrium-90 Radioembolization treatment is typically done 7-10 days after mapping.
3. Post-treatment imaging may be done to confirm tumor localization.

- Ablation of liver metastases or primary HCC may be performed utilizing chemical, chemotherapeutic, radiofrequency, or radioactive isotope. Regardless of the modality of ablation, PET is not considered medically necessary for assessing response to this mode of therapy.

Indication	Medically Necessary Imaging Study
New or worsening signs or symptoms suggestive of metastatic liver involvement or new elevation in LFTs	• CT Abdomen with (CPT® 74160) or without and with (CPT® 74170) contrast

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with suspected liver metastases: • Considering limited resection • Inconclusive CT findings • Inconclusive liver findings on PET/CT	• MRI Abdomen without and with contrast (CPT® 74183)
ONE of the following in individuals with suspected liver metastases **and** no diagnosis-specific guideline regarding PET imaging: • Confirm solitary metastasis amenable to resection on conventional imaging • LFT's and/or tumor markers continue to rise and CT and MRI are negative	• PET/CT (CPT® 78815) ◦ When primary cancer known, PET request should be reviewed by primary cancer guideline
Monitoring of liver metastases that have been surgically resected	• Review according to primary cancer guideline
Evaluation of hepatic artery chemotherapy infusion or TACE (transarterial chemoembolization)	• CTA Abdomen (CPT® 74175) immediately prior to embolization ONE of the following studies immediately prior to and one month post-embolization, if not previously done: • CT Abdomen without and with contrast (CPT® 74170) • MRI Abdomen without and with contrast (CPT® 74183)

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Indication	Medically Necessary Imaging Study
Evaluation for hepatic artery radioembolization with Y-90 radioactive spheres (TheraSphere or SIR Spheres) for liver metastases or primary liver tumors	To assess hepatic vascular anatomy before the procedure, any ONE of the following: • 3D Rendering (CPT® 76377) if conventional hepatic angiogram is being performed • CTA Abdomen (CPT® 74175) ONE of the following studies PRE-treatment based upon provider preference: • Radiopharmaceutical Localization Limited Area (CPT® 78800 or CPT® 78801) • SPECT or SPECT/CT (CPT® 78803, 78831, 78830, or 78832) • CPT® 78835 may be approved as an add-on code with SPECT/CT codes only (CPT® 78803, 78831, 78830, or 78832) for calculation of lung shunt fraction if planar imaging (CPT® 78800 or CPT® 78801) not performed. Liver-lung shunt calculation is included in planar scans and does not require additional Lung Perfusion Scan ONE of the following studies POST-treatment based upon provider preference: • Radiopharmaceutical Localization Limited Area (CPT® 78800 or CPT® 78801) • SPECT or SPECT/CT (CPT® 78803, 78831, 78830, or 78832)
Monitoring of liver metastases or primary tumors following ablation, radioembolization, or chemoembolization	ONE of the following, immediately prior to ablation or embolization, 1 month post-ablation or embolization, then every 3 months for 2 years, and then every 6 months until year 5: • CT Abdomen without and with contrast (CPT® 74170) • MRI Abdomen without and with contrast (CPT® 74183)

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Background and Supporting Information

Liver metastases are the most common malignant lesions involving the liver due to its dual blood supply and filtration of portal venous blood, which facilitates hematogenous spread from extrahepatic malignancies (Maino et al., 2023). Accurate detection and characterization are critical because lesion number, distribution, and vascular characteristics directly influence management decisions, including eligibility for resection, locoregional therapy, or systemic treatment (Maino et al., 2023; Gore et al., 2017).

Liver-directed therapies, including ablation, transarterial chemoembolization (TACE), and radioembolization with yttrium-90 (Y-90), are established treatment options for unresectable or liver-dominant disease and are selected based on tumor burden, distribution, and hepatic functional reserve (Salem et al., 2023; NCCN, 2026). Y-90 radioembolization delivers targeted radiation via the hepatic arterial supply and is used in both primary and metastatic liver malignancies, often in patients with unresectable disease and preserved liver function (Barabasch et al., 2018; NCCN, 2026).

Evidence Discussion

Contrast-enhanced CT of the abdomen is supported as first-line imaging for suspected liver metastases because it enables evaluation of lesion number, vascular enhancement pattern, and associated intra-abdominal findings, which are critical for staging and treatment selection (Maino et al., 2023; Gore et al., 2017). CT is widely available and effective for identifying multifocal disease; however, its limitations in lesion characterization, particularly for small or atypical lesions, justify escalation to MRI when findings are indeterminate or when surgical resection is being considered (Gore et al., 2017; Maino et al., 2023). MRI provides superior soft tissue contrast and improved sensitivity for lesion detection and characterization, supporting its role as a problem-solving modality and for preoperative planning (Maino et al., 2023).

PET/CT is not recommended as first-line imaging for hepatic lesions because it has lower specificity compared with contrast-enhanced CT or MRI for lesion characterization, particularly in the liver where physiologic uptake and variable tumor metabolism may limit accuracy (Barabasch et al., 2018). However, PET/CT has value as a problem-solving tool in selected scenarios, including detection of occult metastatic disease when tumor markers or liver function tests continue to rise despite negative conventional imaging, or to confirm solitary disease prior to curative-intent resection to avoid unnecessary surgery (Barabasch et al., 2018). This selective use balances the benefit of identifying otherwise occult disease with the risks of false-positive findings, additional procedures, and radiation exposure.

Imaging before and after liver-directed therapies such as TACE or hepatic artery infusion is necessary for treatment planning and response assessment, as cross-sectional imaging allows evaluation of tumor viability, vascularity, and treatment-related changes

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(Salem et al., 2023). For Y-90 radioembolization, pre-treatment vascular mapping with CTA and nuclear medicine imaging is supported to assess hepatic arterial anatomy, measure lung shunt fraction, and detect extrahepatic tracer uptake, which are critical for patient safety and appropriate dose delivery (Salem et al., 2023; NCCN, 2026). Post-treatment imaging confirms localization and distribution of therapy, ensuring accurate delivery and identifying complications (Salem et al., 2023).

Ongoing surveillance after ablation or embolization with CT or MRI is supported by evidence demonstrating that cross-sectional imaging reliably detects residual or recurrent tumor and assesses treatment response over time (NCCN, 2026). MRI demonstrates superior diagnostic performance compared with PET/CT in the post-treatment setting, with higher sensitivity and predictive value for detecting viable tumor, while PET has lower sensitivity and may miss residual disease (Barabasch et al., 2018). This supports the recommendation against routine PET imaging for post-ablation or embolization surveillance and instead favors structured CT or MRI follow-up at defined intervals to balance early detection of recurrence with avoidance of unnecessary radiation and cost (NCCN, 2026; Singal et al., 2023).

Health Equity Considerations

Liver metastases, particularly from colorectal cancer, represent a setting in which potentially curative interventions are available, yet access to these therapies is unevenly distributed across patient populations. Population-based analyses consistently demonstrate that liver-directed therapies (LDT), including hepatectomy, ablation, and hepatic artery infusion chemotherapy, are substantially underutilized despite strong associations with long-term survival. Across national cohorts, patients who are Black, of lower socioeconomic status, female, or publicly uninsured are significantly less likely to receive liver-directed interventions, even after adjustment for comorbidity burden and clinical factors (Ahmed et al., 2022; Aquina et al., 2023; Martinez et al., 2026). Structural barriers, including limited access to high-volume hepatobiliary centers, variability in referral patterns, geographic distance, and differential assessment of resectability, contribute directly to inequitable treatment allocation, resulting in avoidable survival disparities for medically appropriate candidates.

Access to specialized centers plays a central role in mediating these disparities. Treatment at high-volume or academic centers is strongly associated with higher likelihood of receiving liver-directed therapy and with improved overall survival, yet patients from marginalized racial and socioeconomic groups are less likely to access such centers or to undergo definitive intervention once evaluated (Ahmed et al., 2022; Aquina et al., 2023; Martinez et al., 2026). Standardized, evidence-based imaging pathways for the detection, staging, and longitudinal assessment of liver metastases help promote equity by supporting timely identification of potentially resectable or ablatable disease regardless of demographic factors. Consistent guideline-driven imaging can facilitate earlier multidisciplinary referral, reduce subjective variability

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in determining treatment candidacy, and ensure that patients with liver-limited or oligometastatic disease are equitably considered for life-prolonging and potentially curative liver-directed therapies (Ahmed et al., 2022; Aquina et al., 2023; Martinez et al., 2026).

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Brain Metastases (ONC-31.3)

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Criteria

Indication	Medically Necessary Imaging Study
Individual with cancer and signs or symptoms of CNS disease or known brain metastasis with new signs or symptoms.	• MRI Brain without and with contrast (CPT® 70553)
To determine candidacy for SRS, and a diagnostic thin-slice MRI Brain has not been performed in the preceding 30 days	• MRI Brain without and with contrast (CPT® 70553)
Stereotactic radiosurgery planning	• Unlisted MRI for treatment planning purposes (CPT® 76498)
Monitoring of brain metastases treated with surgery or radiation therapy	Post-treatment, then every 3 months for 1 year and every 4 months thereafter: • MRI Brain without and with contrast (CPT® 70553) ***Individuals treated with stereotactic radiosurgery alone may have MRI Brain without and with contrast (CPT® 70553) immediately after stereotactic radiosurgery, then every 2 months for the first year, and then every 6 months thereafter
Brain metastases treated with radiation therapy, with recent MRI Brain indeterminate in distinguishing radiation necrosis vs. tumor progression	• MRI Perfusion imaging (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Brain metastases treated with radiation therapy, with recent MRI Brain and MR Perfusion studies both unable to distinguish radiation necrosis vs. tumor progression	• PET Metabolic Brain (CPT® 78608)
Any of the following: • Solitary brain metastasis suspected in individual with prior diagnosis of cancer • Brain metastases and no known primary tumor	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • Mammography for individuals assigned female at birth • PET/CT (CPT® 78815 or CPT® 78816) for ANY of the following: ◦ Inconclusive conventional imaging ◦ Confirm either stable systemic disease or absence of other metastatic disease ◦ When primary cancer known, PET request should be reviewed by primary cancer guideline unless there is no diagnosis-specific guideline regarding PET imaging
Monitoring of brain metastases on systemic therapy or surveillance (in absence of surgery or radiation therapy)	• MRI Brain without and with contrast (CPT® 70553) 2-3 months for 1-2 years, and then every 4-6 months indefinitely
Primary brain tumors	See: **Primary Central Nervous System Tumors (ONC-2)**
MR Spectroscopy (CPT® 76390) is not considered medically necessary for evaluation of metastatic brain cancer.	

Background and Supporting Information

Brain metastases are the most common intracranial malignancies, occurring in approximately 10–40% of cancer patients and outnumbering primary brain tumors by a factor of 10, with incidence increasing due to improved systemic cancer control and surveillance imaging (Mitchell et al., 2022; Mehrabian et al., 2019; Soffietti et al., 2017; Brenner & Patel, 2022). They most frequently arise from lung cancer, breast cancer, and melanoma, with hematogenous spread leading to preferential localization in regions

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of highest cerebral blood flow such as the cerebral hemispheres (Mitchell et al., 2022; Soffietti et al., 2017).

Clinical manifestations of brain metastases vary depending on lesion location and burden, with common symptoms including headache, nausea, vomiting, focal neurologic deficits, seizures, and cognitive impairment, although some patients may remain asymptomatic (Mitchell et al., 2022; Soffietti et al., 2017). Because neurologic symptoms may precede diagnosis or occur in patients with unknown primary malignancy, imaging plays a central role in both detection and staging (Mehrabian et al., 2019; Brenner & Patel, 2022).

Management of brain metastases is multidisciplinary and depends on factors including number, size, location of lesions, performance status, and systemic disease burden, with treatment strategies incorporating surgery, stereotactic radiosurgery (SRS), whole brain radiotherapy (WBRT), and systemic therapies (Mitchell et al., 2022; Soffietti et al., 2017). Accurate imaging is essential not only for diagnosis but also for treatment planning, response assessment, and surveillance due to the risk of recurrence and treatment-related complications such as radiation necrosis (Mitchell et al., 2022; Brenner & Patel, 2022).

Evidence Discussion

MRI of the brain without and with contrast is supported as the primary imaging modality for individuals with cancer and signs or symptoms of central nervous system involvement, as well as for individuals with known brain metastases who develop new neurologic symptoms. MRI provides superior sensitivity compared with CT for detection of intracranial metastatic disease, particularly for small lesions, posterior fossa lesions, and multifocal disease. Contrast-enhanced MRI improves lesion detection and characterization, directly influencing treatment selection and eligibility for local therapies such as surgery or stereotactic radiosurgery (Mitchell et al., 2022; Mehrabian et al., 2019). Similarly, MRI is supported when determining candidacy for stereotactic radiosurgery because accurate lesion number, size, and location are essential for treatment planning and avoidance of undertreatment or inappropriate patient selection (Mitchell et al., 2022; Soffietti et al., 2017).

Serial MRI surveillance following surgery or radiation therapy is supported because intracranial recurrence, progression, and treatment-related complications remain common after local therapy. Regular post-treatment MRI allows earlier detection of local recurrence and distant intracranial failure, facilitating timely intervention while lesions remain amenable to additional local treatment. More frequent surveillance following stereotactic radiosurgery alone is supported by the increased risk of subsequent intracranial progression and the absence of whole-brain treatment, which places patients at continued risk for new metastatic lesions elsewhere in the brain (Mitchell et al., 2022; Soffietti et al., 2017). Similarly, ongoing MRI monitoring is supported in

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individuals managed with systemic therapy alone because intracranial progression may occur despite extracranial disease control (Mitchell et al., 2022).

For individuals previously treated with radiation therapy whose MRI findings are indeterminate for radiation necrosis versus tumor progression, MR perfusion imaging is supported as a problem-solving modality. Perfusion techniques assess tissue vascularity and hemodynamics, providing information that may help distinguish active tumor from treatment-related injury and thereby reduce unnecessary surgery, repeat radiation, or premature changes in systemic therapy. However, overlap between imaging characteristics may persist, particularly in complex lesions (Mitchell et al., 2022; Mehrabian et al., 2019). When both conventional MRI and MR perfusion remain inconclusive, metabolic brain PET imaging is supported because metabolic activity may provide additional diagnostic information that improves characterization of treatment-related change versus viable tumor (Mitchell et al., 2022; Mehrabian et al., 2019).

In individuals presenting with a solitary brain metastasis or brain metastases without an identified primary malignancy, systemic imaging with contrast-enhanced CT of the chest, abdomen, and pelvis is supported because the most common primary tumors originate outside the central nervous system. Mammography is supported when appropriate because breast cancer remains one of the leading causes of brain metastases. PET/CT is appropriately reserved for situations in which conventional imaging is inconclusive, when confirmation of stable systemic disease is needed, or when additional metastatic disease must be excluded. This selective approach maximizes diagnostic yield while limiting unnecessary radiation exposure, false-positive findings, and downstream testing associated with routine PET imaging (Mitchell et al., 2022; Mehrabian et al., 2019; Soffietti et al., 2017).

Health Equity Considerations

Brain metastases require timely access to advanced imaging, neurosurgical evaluation, stereotactic radiosurgery, and systemic therapies, making equitable delivery of care particularly vulnerable to social and structural determinants of health. Population-based analyses consistently demonstrate that socioeconomic status, geography, insurance coverage, and race influence both treatment receipt and survival in patients with brain metastases. Patients from lower socioeconomic strata are significantly less likely to receive radiation, chemotherapy, or surgical intervention and experience shorter overall survival, even after adjustment for tumor and demographic factors (Rodrigues et al., 2023). Rural residence and increased travel burden further limit access to high-volume or academic centers capable of delivering multimodal brain metastasis care, contributing to lower treatment rates and poorer outcomes for rural populations compared with urban counterparts (Riggs et al., 2023).

Racial and ethnic disparities compound these inequities. National database studies show that Black patients are less likely to be recommended or to receive surgery and

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chemotherapy and have among the shortest observed survival times, while Hispanic and Asian patients are also less likely to receive radiation or systemic therapy compared with non-Hispanic White patients (Jiang et al., 2023; Rodrigues et al., 2023). Importantly, analyses adjusting for socioeconomic factors suggest that differences in treatment access and resources rather than inherent biological differences alone account for much of the observed survival gap (Jiang et al., 2023). Standardized, evidence-based recommendations for brain imaging and surveillance help reduce variability driven by geography, insurance status, or referral bias. Consistent guideline-directed imaging supports earlier detection of brain metastases, facilitates timely multidisciplinary evaluation, and promotes equitable consideration for surgery, radiosurgery, and systemic therapies across diverse patient populations (Riggs et al., 2023; Rodrigues et al., 2023; Jiang et al., 2023).

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Adrenal Gland Metastases (ONC-31.4)

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Criteria

Indication	Medically Necessary Imaging Study
Differentiate benign adrenal adenoma from metastatic disease	• See: **Adrenal Cortical Lesions (AB-16.1)** in the Abdomen Imaging Guidelines
Known cancer and no known systemic metastases with: • New adrenal mass • Enlarging adrenal mass • Inconclusive findings on recent CT	If not done previously, ANY of the following: • CT Abdomen without contrast (CPT® 74150) • CT Abdomen without and with contrast (CPT® 74170, adrenal protocol) • MRI Abdomen without contrast (CPT® 74181) • MRI Abdomen without and with contrast (CPT® 74183) • CT-directed needle biopsy (CPT® 77012)
One of the following in individuals with suspected adrenal metastases and no diagnosis-specific guideline regarding PET imaging: • Biopsy is not feasible or is non-diagnostic • Isolated metastasis on conventional imaging and individual is a candidate for aggressive surgical management	• PET/CT (CPT® 78815) When primary cancer known, PET request should be reviewed by primary cancer guideline
Known extra-adrenal malignancy and undiagnosed adrenal mass being monitored off treatment	See: **General Criteria (ONC-1.0)**

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Background and Supporting Information

Adrenal masses are frequently encountered due to widespread use of cross-sectional imaging, with a prevalence ranging from approximately 2% to 10%, the majority of which are benign nonfunctioning adenomas (He et al., 2021; Romanisio et al., 2025). In patients with a known extra-adrenal malignancy, adrenal lesions may represent metastatic disease; however, benign etiologies remain common, necessitating accurate characterization to guide clinical management (Mody et al., 2021; Corwin et al., 2022).

Evidence Discussion

Cross-sectional imaging with CT or MRI is supported as the initial evaluation for adrenal masses in patients with known malignancy because these modalities provide critical information regarding lesion attenuation, washout characteristics, and internal composition that help differentiate benign adenomas from metastatic disease (Mody et al., 2021; Corwin et al., 2022). Noncontrast CT allows measurement of lesion attenuation, with low Hounsfield unit values strongly associated with benign adenomas, while contrast-enhanced CT washout analysis and MRI chemical shift imaging further improve specificity by identifying lipid content or enhancement patterns (He et al., 2021; Romanisio et al., 2025). Despite these strengths, a subset of adrenal lesions remains indeterminate, supporting escalation to additional modalities such as biopsy or advanced imaging when clinically indicated (Mody et al., 2021).

CT-guided biopsy is supported when imaging findings remain inconclusive and tissue diagnosis is required, particularly in patients with known malignancy where confirmation of metastatic disease will alter management (Mody et al., 2021; Corwin et al., 2022). However, biopsy carries procedural risks and requires exclusion of hormonally active tumors such as pheochromocytoma, reinforcing the importance of careful patient selection and use of imaging-based characterization when possible (Romanisio et al., 2025). This supports a stepwise approach prioritizing noninvasive imaging before invasive diagnostic procedures.

PET/CT is not recommended as first-line imaging due to variable specificity and risk of false-positive findings, as benign lesions such as adenomas, hyperplasia, and inflammatory processes may demonstrate increased FDG uptake (He et al., 2021; Romanisio et al., 2025). Diagnostic performance varies, with reported sensitivity around 83–85% and specificity near 90% depending on SUV thresholds, and both false-positive and false-negative results are well documented, particularly in certain tumor types or lesions with necrosis (He et al., 2021). Additionally, SUV-based thresholds (e.g., tumor-to-liver ratios around 1.5–2.5) improve diagnostic accuracy but remain imperfect, reinforcing that PET findings must be interpreted in the context of other imaging and clinical data (Romanisio et al., 2025; He et al., 2021). These limitations support restricting PET/CT to specific scenarios such as non-diagnostic biopsy or surgical planning.

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Selective use of PET/CT in cases where biopsy is not feasible or when confirming isolated metastasis prior to aggressive surgical management is supported by its ability to detect metabolically active disease and identify occult metastases, thereby reducing the risk of unnecessary or noncurative surgery (Mody et al., 2021; Romanisio et al., 2025). However, given the risk of false-positive uptake and potential downstream invasive procedures, PET/CT is best used as a problem-solving tool rather than routine imaging, aligning with a risk-adapted strategy that balances diagnostic yield with avoidance of unnecessary interventions (He et al., 2021; Corwin et al., 2022).

Health Equity Considerations

Adrenal gland metastases are increasingly identified through cross-sectional imaging performed for cancer staging or unrelated indications, making equitable access to high-quality imaging and subspecialty evaluation essential for accurate diagnosis and management. Large institutional series show that more than one-third of adrenal metastases are discovered incidentally and that the majority arise from lung, genitourinary, and gastrointestinal primaries, with renal cell carcinoma and lung cancer most frequently implicated (Mao et al., 2021; Panwar et al., 2024). Reliance on imaging characteristics alone to distinguish benign incidentalomas from metastatic disease is imperfect, particularly in patients without a known malignancy, where adrenal metastasis may represent the initial manifestation of an occult primary tumor (Panwar et al., 2024). Patients with limited access to consistent longitudinal imaging, endocrine consultation, or biopsy services may therefore experience delays in diagnosis, inappropriate reassurance, or missed opportunities for timely oncologic evaluation, exacerbating disparities in outcomes.

Equity concerns are further amplified in patients with bilateral adrenal metastases, who are at meaningful risk for primary adrenal insufficiency, a potentially life-threatening but often under-recognized condition. Population-based cohorts demonstrate that bilateral disease develops in up to 43% of patients over time and that adrenal insufficiency occurs in more than 12% of those with bilateral involvement, particularly among patients with larger tumors and certain primary cancer types (Mao et al., 2021). Early recognition depends on systematic imaging surveillance and biochemical assessment, which may be inconsistently applied in resource-limited settings. Standardized, evidence-based recommendations for adrenal imaging and follow-up help promote equity by supporting timely detection of metastatic involvement, appropriate escalation to biopsy or surgical consultation, and earlier identification of complications such as adrenal insufficiency. Consistent guideline-directed imaging pathways reduce variability driven by access, geography, or referral patterns and help ensure that patients with suspected adrenal metastases receive equitable, high-quality care regardless of socioeconomic or clinical context (Mao et al., 2021; Panwar et al., 2024).

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Bone (Non-Vertebral) Metastases (ONC-31.5)

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Criteria

- This guideline may be used for individuals with or without a history of malignancy, depending on the indications as listed below.

Indication	Medically Necessary Imaging Study
Individuals 40 years of age or older with no history of malignancy who have a symptomatic bone lesion seen on x-ray and malignancy is suspected	EITHER of the following: • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) OR • FDG PET/CT (CPT® 78815 or CPT® 78816)
Individuals less than 40 years of age with a bone lesion on x-ray	See: **Lesion of Bone (MS-10.2)**
Suspected bone metastasis due to ANY of the following in an individual with a current or prior malignancy: • Bone pain • Rising tumor markers • Elevated alkaline phosphatase	• Bone scan (CPT® 78306) supplemented by plain x-rays (see: **Nuclear Medicine (NM) Imaging in Oncology [ONC-1.3]** for additional bone scan codes)

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with suspected bone (non-vertebral) metastases: • Bone scan is not feasible or readily available • Bone scan is equivocal or indeterminate • Continued suspicion despite negative/inconclusive bone scan or other imaging modalities • Soft tissue component suspected on other imaging modalities • Differentiate neoplastic disease from Paget's disease of the bone	EITHER of the following: • MRI without and with contrast of the involved body site • CT without or with contrast of the involved body site
Bone metastases suspected and **both** bone scan and either CT or MRI are inconclusive	• ^{18}F-FDG-PET/CT (CPT® 78815 or CPT® 78816)
EITHER of the following: • No prior cancer history with suspected bone metastatic disease or pathologic fracture on plain x-ray • Adult individuals with a biopsy-proven carcinoma of unknown origin in a bone lesion	• See: **Carcinoma of Unknown Primary Site (ONC-31.7)**

Background and Supporting Information

Bone metastases are the most common malignant lesions of the skeleton, arising from hematogenous spread of tumor cells and occurring more frequently than primary bone tumors, particularly in advanced malignancy (Zhang-Yin & Panagiotidis, 2023; Ahmed et al., 2022). These lesions may be osteolytic, osteoblastic, or mixed, reflecting interactions between tumor cells, osteoblasts, and osteoclasts within the bone microenvironment (Zhang-Yin & Panagiotidis, 2023). The presence of bone metastases is associated with significant morbidity, including skeletal-related events such as pain, fractures, hypercalcemia, and decreased quality of life (Zhang-Yin & Panagiotidis, 2023).

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The likelihood of bone metastases increases with disease progression and recurrence, particularly in malignancies such as breast, prostate, lung, and thyroid cancer, where the skeleton represents a common site of dissemination (Yang et al., 2011; Zhang-Yin & Panagiotidis, 2023). Because metastatic involvement may be multifocal and asymptomatic, imaging plays a central role in detection, staging, and management (Liu et al., 2017; Lombardi et al., 2022).

Evidence Discussion

Bone scintigraphy supplemented by plain radiography is supported as the initial imaging approach in individuals with suspected bone metastases because it provides whole-body evaluation of skeletal involvement and identifies areas of increased osteoblastic activity associated with metastatic disease (Yang et al., 2011; Liu et al., 2017). Bone scan sensitivity is driven by detection of increased bone turnover rather than direct tumor visualization, allowing identification of lesions throughout the skeleton; however, this mechanism also contributes to limited specificity due to overlap with benign processes such as degenerative disease or treatment-related changes (Ahmed et al., 2022; Lombardi et al., 2022). The ability to evaluate the entire skeleton in a single study supports its use as first-line imaging, minimizing the risk of missing multifocal metastatic disease (Yang et al., 2011).

MRI and CT are supported as problem-solving modalities when bone scan findings are equivocal, not feasible, or when clinical suspicion persists despite negative results, as these modalities provide improved anatomic detail and soft tissue characterization (Liu et al., 2017; Di Primio et al., 2023). MRI offers high sensitivity for marrow involvement and is particularly valuable when a soft tissue component is suspected, helping prevent understaging and undertreatment (Lombardi et al., 2022). CT provides detailed evaluation of cortical bone integrity and can assist in differentiating benign from malignant processes, including conditions such as Paget disease, although its overall sensitivity is lower than MRI for early marrow lesions (Qu et al., 2012; Di Primio et al., 2023). This tiered approach balances diagnostic accuracy with appropriate utilization of more resource-intensive imaging.

PET/CT demonstrates variable diagnostic performance depending on tumor histology, reflecting differences in metabolic activity and osteoblastic response across malignancies (Zhang-Yin & Panagiotidis, 2023). While PET techniques, including FDG PET/CT and 18F-NaF PET/CT, can provide high sensitivity for detecting bone metastases, particularly with early marrow involvement or high bone turnover, they are limited by false-positive findings due to benign conditions such as fractures, inflammation, or therapy-induced changes, and may show reduced sensitivity in certain tumor types (Ahmed et al., 2022; Zhang-Yin & Panagiotidis, 2023). Additionally, higher radiation exposure and variability in specificity support restricting PET/CT to a problem-solving role when conventional imaging is inconclusive rather than routine first-line use (Zhang-Yin & Panagiotidis, 2023).

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In individuals without known malignancy but with suspicious bone lesions, systemic imaging with CT of the chest, abdomen, and pelvis or PET/CT is supported to identify a potential primary malignancy, as bone metastases are often secondary to cancers such as breast, prostate, lung, or thyroid (Zhang-Yin & Panagiotidis, 2023; NCCN, 2026). NCCN guidelines support the use of bone scan or PET/CT as part of the diagnostic workup for suspected metastatic disease, emphasizing multimodality imaging to establish diagnosis and guide management (NCCN, 2026). This approach helps ensure appropriate staging and reduces the risk of delayed diagnosis while avoiding unnecessary invasive procedures when imaging can identify a primary source or additional metastatic sites.

Health Equity Considerations

Non-vertebral metastatic bone disease (MBD) represents a common and morbid manifestation of advanced cancer, and substantial health equity gaps influence when and how these lesions are detected and managed. Large population-based analyses demonstrate consistent sex, racial/ethnic, and socioeconomic disparities in the incidence of MBD at cancer diagnosis, particularly for lung, prostate, breast, renal, and colorectal primaries (Jawad et al., 2023). Patients from lower socioeconomic strata and certain racial and ethnic minority groups, especially Non-Hispanic Black and American Indian/Alaska Native populations, present with bone metastases at higher rates, suggesting delayed diagnosis of primary malignancy, limited access to screening, and barriers to timely imaging and oncologic care (Jawad et al., 2023). Because appendicular skeletal metastases often serve as an early indicator of disseminated disease, inequities in access to diagnostic imaging and orthopedic oncology evaluation may lead to higher rates of pathologic fracture, unplanned hospitalizations, and worse functional outcomes in socially disadvantaged populations (Jawad et al., 2023; DiCaprio et al., 2022).

These disparities are compounded by the significant economic and psychosocial burden associated with non-vertebral skeletal-related events, including fractures of the long bones and pelvis. Metastatic bone disease accounts for a substantial proportion of overall cancer care costs and is associated with loss of mobility, diminished quality of life, caregiver strain, and financial hardship, effects that disproportionately impact patients with fewer social and financial resources (DiCaprio et al., 2022). Early identification of appendicular bone metastases through appropriate imaging can facilitate prophylactic interventions, reduce fracture risk, and lower downstream costs, yet timely imaging is not uniformly accessible across populations (DiCaprio et al., 2022; Jawad et al., 2023). Standardized, evidence-based recommendations for imaging of suspected non-vertebral bone metastases support more equitable care by promoting consistent evaluation regardless of sex, race/ethnicity, or socioeconomic status. Guideline-directed imaging helps reduce variability in diagnostic pathways, supports earlier multidisciplinary intervention, and may mitigate preventable morbidity

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associated with advanced metastatic bone disease in historically underserved groups (Jawad et al., 2023; DiCaprio et al., 2022).

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Spinal/Vertebral Metastases (ONC-31.6)

ON.UP.0031.6.A
v1.0.2027

Criteria

- Individuals with stage IV cancer with new onset back pain can forgo a bone scan (and plain films) in lieu of an MRI with and without contrast of the spine.

Indication	Medically Necessary Imaging Study
Individuals 40 years of age or older with no history of malignancy who have a symptomatic bone lesion seen on x-ray and malignancy is suspected	EITHER of the following: • CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and Bone scan (CPT® 78306) OR • FDG PET/CT (CPT® 78815 or CPT® 78816)
Known cancer history and spinal cord compression suspected based on signs/ symptoms of neurological compromise, including, but not limited to: • Unexpected, sudden loss of bowel or bladder control • Sudden loss of ability to ambulate • Complete loss of pinprick sensation corresponding to a specific vertebral level • Loss of pain at a site that had previously been refractory to pain management	MRI Cervical (CPT® 72156), MRI Thoracic (CPT® 72157), and MRI Lumbar Spine (CPT® 72158) without and with contrast OR without contrast (CPT® 72141, CPT® 72146, or CPT® 72148) • CT Cervical (CPT® 72126), CT Thoracic (CPT® 72129), and CT Lumbar (CPT® 72132) Spine with contrast if MRI is contraindicated

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Indication	Medically Necessary Imaging Study
Individual with a known history of cancer and ANY of the following: • Metastatic or stage IV cancer with new or worsening back pain • Continued suspicion despite negative/ inconclusive bone scan or other imaging modalities • Back pain and suspicion of spinal malignancy based on any one of the following: ◦ Night pain ◦ Age greater than 70 years ◦ Uncontrolled or unintentional weight loss ◦ Pain unrelieved by change in position ◦ Severe or worsening spinal pain	ONE of the following: • MRI of the relevant spinal level without contrast • MRI of the relevant spinal level without and with contrast • CT of the relevant spinal level without contrast • CT Myelogram of the relevant spinal level
Monitoring untreated vertebral metastases	One of the following, every 3 months for 1 year: • MRI without and with contrast of the involved spinal level • CT without or with contrast of the involved spinal level **Imaging beyond 1 year is based on any new clinical signs/symptoms
Monitoring metastases within the spine treated with surgery and/or radiation therapy	One of the following, once within 3 months post-treatment, and then every 3 months for 1 year: • MRI without and with contrast of the involved spinal level • CT without or with contrast of the involved spinal level **Imaging beyond 1 year is based on any new clinical signs/symptoms

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Indication	Medically Necessary Imaging Study
Leptomeningeal involvement with cancer	Suspected: • MRI Brain without and with contrast (CPT® 70553) and MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast • CT Cervical (CPT® 72127), Thoracic (CPT® 72130), and Lumbar Spine (CPT® 72133) without and with contrast is medically necessary if MRI is contraindicated or not readily available On active treatment: • MRI Brain without and with contrast (CPT® 70553) and MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast every 2 cycles • CT without or with contrast of the involved spinal level if MRI is contraindicated Once treatment completed: • Routine advanced imaging is not consideredmedically necessary for surveillance in asymptomatic individuals

Background and Supporting Information

Spinal/vertebral metastases most commonly arise from hematogenous dissemination of systemic malignancies to the vertebral column and may extend into the epidural space, resulting in compression of neural structures including the spinal cord (Lawton et al., 2019). Metastatic spinal cord compression (MSCC) is a potentially catastrophic complication of advanced cancer associated with progressive neurologic decline, impaired mobility, and reduced quality of life, and is considered an oncologic emergency requiring prompt diagnosis and intervention (Lawton et al., 2019).

Clinical manifestations vary depending on the level and extent of disease but commonly include back pain, which is reported in up to 80–95% of cases, as well as motor weakness, sensory deficits, and later bowel or bladder dysfunction (Lawton et al., 2019). The presence of neurologic deficits reflects compression of the spinal cord or nerve

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roots and may indicate advanced disease, with symptoms localizing variably depending on the affected spinal segment (Lawton et al., 2019).

Evidence Discussion

In individuals 40 years of age or older without a known history of malignancy who present with a symptomatic bone lesion on x-ray with suspicion for malignancy, systemic imaging is supported to identify a primary malignancy and evaluate for metastatic disease. Cross-sectional imaging with CT of the chest, abdomen, and pelvis in combination with bone scintigraphy enables whole-body evaluation of potential primary tumor sites and skeletal involvement, while FDG PET/CT provides an alternative whole-body modality for identifying metabolically active primary and metastatic disease (Expert Panel on Neurologic Imaging, 2019; Lawton et al., 2019). This approach ensures comprehensive staging and reduces the risk of missed systemic disease when spinal involvement may represent the first manifestation of malignancy.

MRI of the spine without and with contrast is supported as the primary imaging modality for suspected spinal/vertebral metastases and spinal cord compression because of its high sensitivity and specificity for detecting epidural disease, marrow infiltration, and neural compression (Lawton et al., 2019). MRI provides superior soft tissue contrast and multiplanar capability, enabling accurate localization of disease and evaluation of the extent of spinal involvement, which is critical for treatment planning (Expert Panel on Neurological Imaging, 2021). In cases of suspected malignant spinal cord compression, imaging of the entire spine is supported due to the presence of multiple, noncontiguous levels of disease in approximately 20–35% of individuals, reducing the risk of missed lesions (Lawton et al., 2019).

MRI is also supported for individuals with known malignancy and new or worsening back pain, even in the absence of overt neurological deficits, as early detection of spinal metastases or impending cord compression may prevent irreversible neurologic injury (Lawton et al., 2019). Compared with CT, MRI provides superior assessment of spinal cord involvement, epidural extension, and marrow disease, whereas CT is limited primarily to evaluation of osseous structures and has lower sensitivity for soft tissue disease (Expert Panel on Neurological Imaging, 2021). Therefore, CT is generally reserved for cases where MRI is contraindicated or unavailable, supporting a risk-based imaging hierarchy consistent with the clinical criteria (Expert Panel on Neurologic Imaging, 2019).

Ongoing imaging surveillance with MRI or CT following treatment is supported to assess response, detect progression, and evaluate complications such as recurrent cord compression or leptomeningeal spread (Lawton et al., 2019). MRI is particularly valuable in this setting due to its ability to detect soft tissue changes, edema, and recurrent disease, while CT may be used when MRI is contraindicated (Expert Panel on Neurological Imaging, 2021). This structured approach to imaging balances early

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detection of clinically significant disease with avoidance of unnecessary imaging, consistent with the clinical criteria emphasizing symptom-driven evaluation and appropriate modality selection.

Health Equity Considerations

Spinal and vertebral metastases are a frequent and morbid complication of advanced cancer, often presenting with pain, pathologic fracture, or spinal cord compression that requires urgent, multidisciplinary care. Despite advances in surgical techniques, radiation therapy, and integrated spine oncology programs, substantial disparities persist in access to timely intervention and clinical outcomes. Large systematic and population-based analyses demonstrate that Black patients, those with Medicaid or no insurance, and individuals from lower socioeconomic backgrounds are less likely to receive surgical intervention for metastatic spine disease and more likely to present with advanced neurologic compromise, experience perioperative complications, prolonged hospitalizations, and non-routine discharge dispositions compared with White or privately insured patients (Ehioghae et al., 2025). Hospital-level factors further compound these inequities, as socially disadvantaged patients are disproportionately treated at low-volume or non-teaching institutions, which are associated with higher complication rates and mortality in spine oncology (Ehioghae et al., 2025).

Equity gaps are also reinforced by limitations in the evidence base guiding spinal metastases management. A recent analysis of North American clinical trials revealed marked underreporting of race, ethnicity, and socioeconomic variables, with substantial underrepresentation of racial and ethnic minority groups and complete absence of socioeconomic data in most trials (Bangash et al., 2025). This lack of inclusive reporting limits the generalizability of trial findings and may perpetuate disparities by informing practice guidelines that do not fully reflect the populations most affected by metastatic spine disease. Standardized, evidence-based imaging recommendations for suspected spinal and vertebral metastases support health equity by promoting consistent evaluation regardless of race, insurance status, or socioeconomic position. Guideline-directed imaging facilitates earlier diagnosis, timely referral to multidisciplinary spine oncology teams, and more equitable access to surgical or radiotherapeutic interventions, helping to mitigate preventable neurologic morbidity among historically underserved populations (Ehioghae et al., 2025; Bangash et al., 2025).

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Carcinoma of Unknown Primary Site (ONC-31.7)

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Criteria

- This guideline also applies to a pathologic fracture that is clearly due to metastatic neoplastic disease in an individual without a previous cancer history.
- Detailed history and physical examination including pelvic and rectal exams and laboratory tests to be performed before advanced imaging.
- Individuals presenting with a thoracic squamous cell carcinoma described as metastatic appearing on chest imaging, or in lymph nodes above the clavicle, should undergo a detailed head and neck examination by a clinician skilled in laryngeal and pharyngeal examinations, especially in smokers.
- Individuals with suspected unknown primary based on only suspicious lytic bone lesions should be considered for serum protein electrophoresis (SPEP), urine protein electrophoresis (UPEP), and serum free light chains prior to consideration of extensive imaging.

Indication	Medically Necessary Imaging Study
Carcinoma found in a lymph node or in an organ known not to be primary	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Neck with contrast (CPT® 70491) if cervical or supraclavicular involvement • CT with contrast or MRI without and with contrast of any other symptomatic site • For individuals assigned female at birth: ◦ Diagnostic (not screening) mammogram and full pelvic exam ◦ MRI Breasts Bilateral (CPT® 77049) if pathology consistent with breast primary and mammogram is inconclusive

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Indication	Medically Necessary Imaging Study
Sebaceous carcinoma of the skin (can be associated with underlying primary malignancy)	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) • CT Neck with contrast (CPT® 70491) if cervical or supraclavicular involvement • CT with contrast or MRI without and with contrast of any other symptomatic site
Axillary adenocarcinoma	• Diagnostic (not screening) mammogram and full pelvic exam as indicated • MRI Breasts Bilateral (CPT® 77049) if pathology consistent with breast primary and mammogram is inconclusive • If the above are non-diagnostic for primary site: ◦ CT Neck (CPT® 70491), CT Chest (CPT® 71260), and CT Abdomen (CPT® 74160) with contrast ◦ CT with contrast or MRI without and with contrast of any other symptomatic site
EITHER of the following: • Carcinoma found within a bone lesion • Unexplained pathologic fracture	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) • Bone Scan (CPT® 78306) (see: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • CT with contrast or MRI without and with contrast of any symptomatic site
ANY of the following: • Above studies have failed to demonstrate site of primary • CT scans reveal isolated metastatic disease for which definitive curative therapy is planned	• PET/CT (CPT® 78815 or CPT® 78816)
Post-treatment surveillance	• Follow-up with CT Chest (CPT® 71260), CT Abdomen and Pelvis (CPT® 74177), and CT of any other involved areas every 6-12 months for 5 years

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Background and Supporting Information

Carcinoma of unknown primary (CUP) refers to histologically confirmed metastatic malignancy identified in a lymph node or organ that is not the expected site of origin for the tumor type, where the primary tumor remains unidentified after standard evaluation (NCCN, 2026). CUP represents a heterogeneous group of cancers characterized by early dissemination, unpredictable metastatic patterns, and aggressive clinical behavior (NCCN, 2026). Common sites of involvement include lymph nodes, liver, lung, bone, and brain, reflecting widespread disease at presentation (NCCN, 2026).

CUP most commonly occurs in older adults and accounts for approximately 2%–9% of all malignancies, with a median survival of approximately 8–12 months, although a subset of patients demonstrates more favorable outcomes based on clinical and pathologic features (NCCN, 2026). Prognosis is influenced by factors including tumor histology, number and sites of metastases, and performance status, with disseminated disease generally associated with poor outcomes (NCCN, 2026; Ren et al., 2023). Bone metastases of unknown origin are associated with particularly poor survival, with reported 1-year survival rates of approximately 15% (Ren et al., 2023).

Evidence Discussion

Cross-sectional imaging with CT of the chest, abdomen, and pelvis is supported as the primary imaging modality in the evaluation of CUP because it provides comprehensive assessment of common primary tumor sites and metastatic disease burden (NCCN, 2026). This approach allows identification of clinically significant disease distribution and guides further targeted imaging or biopsy, supporting accurate staging while minimizing unnecessary imaging. However, CT has limitations in detecting small or early primary tumors, particularly in anatomically complex regions, and may not identify all potential primary sites (NCCN, 2026; Bansal et al., 2022).

Additional site-directed imaging with CT or MRI is supported when symptoms or clinical findings localize disease, as these modalities provide improved anatomic detail and tissue characterization (NCCN, 2026). MRI is particularly useful for evaluating soft tissue involvement and specific organ systems, while CT remains valuable for evaluation of thoracic and abdominal structures. This targeted imaging approach improves diagnostic yield while limiting unnecessary imaging of uninvolved regions, balancing diagnostic accuracy with resource utilization (Sivakumaran et al., 2024).

In individuals with carcinoma involving bone lesions or unexplained pathologic fractures, the addition of bone scintigraphy is supported to evaluate the extent of skeletal disease and identify additional metastatic sites (NCCN, 2026). Bone metastases are common in CUP and are associated with poor prognosis, highlighting the importance of whole-skeleton evaluation to guide staging and management decisions (Ren et al., 2023). Morphologic patterns of bone involvement may also provide indirect clues regarding the potential primary tumor, although specificity remains limited.

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PET/CT is supported as a problem-solving modality when conventional imaging fails to identify a primary site or when isolated metastatic disease is identified and definitive therapy is planned (NCCN, 2026). Evidence demonstrates that PET/CT can detect primary tumors in a subset of CUP patients, but its diagnostic performance is variable and associated with intermediate specificity, with potential for false-positive findings (Sivakumaran et al., 2024; Bansal et al., 2022). Therefore, restricting PET/CT to selected clinical scenarios helps optimize its diagnostic benefit while minimizing unnecessary imaging, cost, and downstream interventions.

Health Equity Considerations

Carcinoma of unknown primary (CUP) represents a diagnostically complex and clinically aggressive entity, with persistently poor outcomes despite advances in imaging and pathologic evaluation. Population-based analyses demonstrate substantial socioeconomic and racial disparities in both the diagnosis and survival of patients with CUP. Data from the Surveillance, Epidemiology, and End Results (SEER) program indicate that CUP is disproportionately diagnosed among older adults, Black patients, women, and individuals residing in less affluent or less educated communities, with these groups also less likely to undergo histologic confirmation of disease (Urban et al., 2013). Median survival remains approximately three months overall, with significantly worse outcomes observed among Black patients and those from socioeconomically disadvantaged areas, even after adjustment for clinical and demographic factors (Urban et al., 2013). These findings suggest that inequities in access to timely and comprehensive diagnostic evaluation, including advanced imaging, contribute meaningfully to observed disparities in staging accuracy, initiation of therapy, and survival.

Equity gaps in CUP care are further reinforced by differential access to modern diagnostic resources. Urban et al. (2013) demonstrated that patients from poorer or less educated regions were less likely to receive adequate diagnostic workup, including pathologic confirmation, and that such limitations were associated with markedly shorter survival. Given that improvements in imaging modalities, including cross-sectional imaging and PET/CT, have been central to reducing the proportion of cancers classified as CUP, inconsistent access to these tools risks perpetuating disparities by delaying identification of a treatable primary malignancy or appropriate site-directed therapy (Urban et al., 2013). Standardized, guideline-directed imaging pathways for suspected CUP can help mitigate these inequities by promoting consistent diagnostic evaluation regardless of race, age, or socioeconomic status, supporting earlier diagnosis, more accurate classification, and more equitable access to subsequent oncologic management.

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Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors (ONC-31.8)

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Criteria

- All poorly-differentiated small cell and large cell neuroendocrine tumors arising outside the lungs or of unknown primary origin are imaged according to these guidelines.
- For intrathoracic poorly differentiated neuroendocrine cancer, see: **Small Cell Lung Cancer (ONC-7)**

Indication	Medically Necessary Imaging Study
Initial staging of extrathoracic small cell and large cell neuroendocrine tumors	ONE of the following combinations: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • CT Chest with contrast (CPT® 71260) and MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
Inconclusive findings on conventional imaging studies in individuals with extrathoracic small cell and large cell neuroendocrine tumors	• PET/CT (CPT® 78815)
ANY of the following in individuals with extrathoracic small cell and large cell neuroendocrine tumors: • Poorly differentiated neuroendocrine cancers of the head or neck • Signs or symptoms of CNS involvement	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Restaging during treatment in individuals with extrathoracic small cell and large cell neuroendocrine tumors	ONE of the following combinations, every 2 cycles: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) and CT of any known sites of disease with contrast • CT Chest with contrast (CPT® 71260) and MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) and CT with contrast of any known sites of disease
Suspected Recurrence in individuals with extrathoracic small cell and large cell neuroendocrine tumors	ANY or ALL of the following are medically necessary: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast or CT Chest with contrast (CPT® 71260) and MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) • MRI Brain without and with contrast (CPT® 70553) • Bone scan (CPT® 78306) (See: **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)** for additional bone scan codes) • PET imaging is generally **not** considered medically necessary but can be considered for rare circumstances.
Surveillance in individuals with extrathoracic small cell and large cell neuroendocrine tumors	ONE of the following combinations every 3 months for 1 year, then every 6 months: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) • CT Chest with contrast (CPT® 71260) and MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

Background and Supporting Information

Poorly differentiated neuroendocrine neoplasms (NENs), including small cell and large cell neuroendocrine carcinomas, are aggressive epithelial malignancies that can arise in multiple extrathoracic sites, including the gastrointestinal tract and pancreas, and are distinct from well-differentiated neuroendocrine tumors in both biology and prognosis (Kaewput et al., 2022; NCCN, 2025). These tumors are characterized by high proliferative activity and rapid progression, with a marked propensity for early metastatic spread, particularly to the liver, lymph nodes, bone, and central nervous system (NCCN, 2025).

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Tumor grade is a critical determinant of imaging behavior and prognosis. High-grade neuroendocrine carcinomas are associated with increased metabolic activity, poorer outcomes, and a higher likelihood of systemic dissemination, necessitating comprehensive staging and interval reassessment during treatment and follow-up (Kaewput et al., 2022; NCCN, 2025).

Evidence Discussion

Contrast-enhanced CT of the chest, abdomen, and pelvis is supported as the primary imaging modality for initial staging and restaging of poorly differentiated extrathoracic neuroendocrine carcinomas because it provides high sensitivity for detection of primary and metastatic disease and allows comprehensive anatomic evaluation (Kaewput et al., 2022; Poltorak-Szymczak et al., 2021). Reported diagnostic performance demonstrates sensitivity and specificity ranging from approximately 82%–100% for cross-sectional imaging, supporting its use as first-line evaluation (Kaewput et al., 2022). MRI is an appropriate alternative for abdominal and pelvic evaluation, offering improved sensitivity for hepatic and bone marrow metastases, but both modalities primarily assess anatomic changes and may have limitations in detecting small or early lesions (Kaewput et al., 2022; Poltorak-Szymczak et al., 2021).

FDG PET/CT is not supported as routine first-line imaging in poorly differentiated neuroendocrine tumors due to variability in diagnostic performance and lack of consistent superiority over conventional imaging; however, it provides important complementary metabolic information and is useful as a problem-solving modality when conventional imaging is inconclusive (Kaewput et al., 2022; NCCN, 2025). FDG PET is more sensitive in high-grade tumors because of increased glycolytic activity, and positive uptake correlates with aggressive biology, poorer prognosis, and shorter progression-free and overall survival (Kaewput et al., 2022). Despite this, variability in sensitivity and lack of standardized thresholds support limiting its use to selected clinical scenarios rather than routine staging.

MRI of the brain is supported in individuals with poorly differentiated neuroendocrine carcinomas of the head and neck or when there are signs or symptoms of central nervous system involvement, as these tumors have a recognized risk of CNS metastases (NCCN, 2025). MRI provides superior sensitivity for detection of brain metastases compared with CT and allows early identification of clinically significant disease, supporting timely intervention and improved neurologic outcomes (NCCN, 2025).

Serial cross-sectional imaging during treatment and surveillance is supported due to the aggressive nature and high recurrence risk of poorly differentiated neuroendocrine carcinomas (NCCN, 2025). Repeating imaging at defined intervals allows assessment of treatment response and early detection of disease progression or recurrence. Although PET imaging is not routinely recommended for surveillance, selective use may be

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considered in rare circumstances where additional metabolic characterization may influence management, balancing diagnostic benefits with cost and potential for false-positive findings (Kaewput et al., 2022; NCCN, 2025).

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Primary Peritoneal Mesothelioma (ONC-31.9)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging in individuals with primary peritoneal mesothelioma	• CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • PET/CT (CPT® 78815) if there is no evidence of metastatic disease or conventional imaging is inconclusive
Recurrence/ Restaging in individuals with primary peritoneal mesothelioma	• If there is known prior disease, CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • PET for inconclusive finding on conventional imaging
Surveillance in individuals with primary peritoneal mesothelioma	• CT Abdomen and Pelvis with contrast (CPT® 74177) every 3-6 months for 5 years, then annually until year 10

Background and Supporting Information

Primary malignant peritoneal mesothelioma (PPM) is a rare and aggressive malignancy arising from mesothelial cells lining the peritoneum, accounting for approximately 10%–15% of all mesotheliomas (Acs et al., 2022; NCCN, 2026). The disease is characterized by diffuse peritoneal involvement, extensive intraperitoneal tumor spread, and relatively limited hematogenous dissemination, with most disease burden confined to the abdominal cavity (Acs et al., 2022). PPM is associated with significant morbidity and mortality, and prognosis is generally poor, particularly in advanced-stage disease (Ma & Zhang, 2022).

PPM most commonly presents at an advanced stage due to nonspecific clinical symptoms and lack of early disease markers, contributing to delays in diagnosis

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(Ma & Zhang, 2022; Acs et al., 2022). Histologic classification includes epithelioid, sarcomatoid, and biphasic subtypes, with significant prognostic implications, as epithelioid histology is associated with more favorable outcomes (Ma & Zhang, 2022; NCCN, 2026). Tumor burden and disease distribution are commonly assessed using the peritoneal cancer index (PCI), which correlates with stage and prognosis (Acs et al., 2022).

Treatment strategies are guided by disease extent and patient factors, with cytoreductive surgery combined with hyperthermic intraperitoneal chemotherapy (HIPEC) representing the primary treatment modality for eligible patients and associated with improved survival outcomes compared to historical treatment approaches (Acs et al., 2022; NCCN, 2026). Imaging is therefore essential for staging, assessing operability, and monitoring disease course.

Evidence Discussion

Contrast-enhanced CT of the chest, abdomen, and pelvis is supported as the primary imaging modality for initial staging and restaging of primary peritoneal mesothelioma because it provides comprehensive assessment of disease distribution, including peritoneal involvement, lymphadenopathy, and potential metastatic disease (NCCN, 2026). PPM typically presents with diffuse intraperitoneal tumor spread, and CT allows evaluation of tumor burden and confirmation that disease is not secondary to another primary malignancy (Acs et al., 2022). CT also enables assessment of common sites of spread, including local lymph nodes and pleural extension, which are more frequent than distant metastases (Acs et al., 2022).

CT imaging is favored over MRI for routine staging and restaging due to its overall higher sensitivity for this disease process and ability to evaluate the entire thoracoabdominal cavity in a single examination (NCCN, 2026). MRI may be used as a complementary modality for further characterization of indeterminate lesions, particularly within the liver, but is not routinely used as first-line imaging (NCCN, 2026). This imaging hierarchy supports accurate staging while minimizing unnecessary additional imaging and resource utilization.

PET/CT demonstrates variable sensitivity in PPM, with reported ranges from approximately 58% to 100%, reflecting heterogeneity in tumor biology and metabolic activity (NCCN, 2026). Because of this variability, PET/CT is not supported as a primary staging modality but may provide incremental value by detecting small peritoneal implants or occult disease not visualized on conventional imaging, which may alter management decisions (NCCN, 2026). Use of PET/CT in this selective manner reduces the risk of both under-staging and overutilization of advanced imaging.

For surveillance and post-treatment monitoring, routine cross-sectional imaging is supported due to the high risk of recurrence, particularly within the first several years following treatment (Acs et al., 2022; NCCN, 2026). Frequent imaging in the early post-

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treatment period is justified by the high rate of recurrence, with a majority of recurrences occurring within the first few years, while longer-term follow-up remains necessary due to the potential for late recurrence (Acs et al., 2022). This structured imaging approach balances early detection of clinically significant recurrence with avoidance of excessive imaging over time.

Health Equity Considerations

Primary peritoneal mesothelioma (PPM) is a rare and aggressive malignancy characterized by nonspecific clinical manifestations, frequently resulting in delayed diagnosis and advanced disease at presentation. Population-based analyses demonstrate that PPM predominantly affects older adults and is more commonly diagnosed in male and White patients; however, women comprise a substantial proportion of cases compared with pleural mesothelioma, suggesting differing exposure patterns and diagnostic pathways (Ullah et al., 2022; Dusseault et al., 2022). The insidious onset of symptoms such as ascites and abdominal pain, coupled with historically high rates of undefined histology and late-stage disease in registry data, underscores persistent inequities in timely recognition and comprehensive diagnostic evaluation, including imaging-based disease characterization (Ullah et al., 2022; Calthorpe et al., 2023). Limited awareness of paraoccupational asbestos exposure and variable access to advanced cross-sectional imaging may further contribute to delays in diagnosis among socioeconomically and geographically disadvantaged populations (Dusseault et al., 2022; Karpes et al., 2023).

Health system-level factors also play a significant role in outcome disparities for PPM. Evidence indicates that survival improvements over time are closely linked to accurate histologic classification and access to cancer-directed surgery, including cytoreductive surgery with hyperthermic intraperitoneal chemotherapy, which are typically available only at specialized, high-volume centers (Calthorpe et al., 2023; Karpes et al., 2023). Patients without access to these centers may experience incomplete staging, limited imaging surveillance, or receipt of non-definitive therapies, exacerbating existing disparities. Given the central role of contrast-enhanced CT, and, in selected cases, MRI or PET, in defining disease extent, operability, and treatment response, consistent application of evidence-based imaging recommendations supports health equity by promoting uniform diagnostic evaluation and facilitating appropriate referral regardless of sex, race, socioeconomic status, or geographic location (Ullah et al., 2022; Karpes et al., 2023).

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Kaposi's Sarcoma (ONC-31.10)

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Criteria

Indication	Medically Necessary Imaging Study
Kaposi's Sarcoma	• Advanced imaging is not considered medically necessary since disease is generally localized to skin. • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast at initial diagnosis. If initial scans are negative then future imaging would be based on signs or symptoms.

Background and Supporting Information

Kaposi sarcoma (KS) is a multifocal endothelial malignancy associated with infection by Kaposi sarcoma–associated herpesvirus (KSHV/HHV-8), and is characterized by cutaneous, mucosal, and, less commonly, visceral involvement. KS presents classically with purpuric, red, or brown macules, papules, or plaques and may occur in several clinical forms, including HIV-associated, classic, iatrogenic (transplant-associated), and endemic disease. Immunosuppression plays a central role in pathogenesis, with increased incidence and more aggressive disease observed in individuals with impaired immune function, particularly those with HIV infection (NCCN, 2025).

Disease extent in KS varies from limited cutaneous involvement to advanced disease affecting lymph nodes, viscera, or mucosal surfaces, with staging based on tumor burden, immune status, and systemic disease factors. Most cases are confined to the skin and subcutaneous tissues; however, visceral involvement may occur, particularly in advanced or immunosuppressed states. The clinical course is influenced by immune status and disease distribution, and management strategies are guided by the extent of disease and associated symptoms (NCCN, 2025).

Evidence Discussion

Kaposi sarcoma is most commonly localized to the skin, and therefore routine advanced imaging is not supported in asymptomatic individuals without evidence of visceral involvement, as the diagnostic yield is low and clinical examination is generally sufficient for disease evaluation. Limiting imaging in this population reduces unnecessary radiation exposure, cost, and incidental findings that may lead to additional testing, while maintaining appropriate clinical management based on physical examination and symptom assessment (NCCN, 2025).

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CT of the chest, abdomen, and pelvis with contrast at initial diagnosis is supported to evaluate for visceral disease, which may not be clinically apparent, particularly in individuals with HIV-associated or advanced disease. This approach helps prevent under-staging and ensures appropriate identification of patients who may require systemic therapy, as visceral or nodal involvement is associated with more advanced disease and different management strategies. However, because visceral involvement is not present in the majority of cases, imaging is limited to initial staging rather than routine repeated evaluation in all patients (NCCN, 2025).

Subsequent imaging is appropriately guided by signs or symptoms suggestive of new or progressive visceral involvement, as clinical changes such as gastrointestinal or pulmonary symptoms may indicate disease progression beyond cutaneous sites. This symptom-directed approach balances the need for detection of clinically significant disease with avoidance of unnecessary imaging, particularly given that KS lesions may wax and wane and are often monitored clinically (NCCN, 2025).

There is no evidence supporting routine surveillance imaging in Kaposi sarcoma in the absence of symptoms or known visceral disease, as recurrence or progression is frequently detected clinically and ongoing imaging may contribute to patient burden without improving outcomes. Instead, follow-up relies on clinical evaluation and monitoring of disease extent, with imaging reserved for cases where new clinical findings raise concern for internal disease involvement or complications (NCCN, 2025).

Health Equity Considerations

Kaposi's sarcoma (KS) is an angioproliferative malignancy strongly linked to human herpesvirus-8 infection and immunosuppression, most commonly in the setting of HIV. Although the widespread adoption of combination antiretroviral therapy (ART) has led to substantial declines in KS incidence and mortality in the United States, these improvements have not been equitably distributed. Large population-based analyses demonstrate persistent and pronounced racial, sex-based, and geographic disparities, with Black men experiencing substantially higher incidence and mortality rates than White men, particularly in the Southern United States (Royse et al., 2017; Raja et al., 2025). Black patients are more likely to be diagnosed at younger ages and with more advanced disease, reflecting inequities in HIV prevention, testing, linkage to care, and sustained viral suppression rather than biologic differences alone (Anthony et al., 2023; Raja et al., 2025). These disparities directly affect patterns of diagnostic imaging, as delayed presentation may necessitate more extensive baseline evaluation to assess visceral, pulmonary, or nodal involvement.

Structural and health-system factors further reinforce inequities in KS outcomes and imaging utilization. Lower rates of ART adherence, higher levels of medical mistrust, underinsurance, and limited access to subspecialty HIV-oncology care among marginalized populations contribute to delayed diagnosis, fragmented staging,

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and inconsistent longitudinal assessment (Anthony et al., 2023; Royse et al., 2017). Geographic disparities are particularly evident in the U.S. South, where higher regional HIV burden and reduced access to comprehensive care are associated with increasing KS incidence among Black men despite national downward trends (Royse et al., 2017; Raja et al., 2025). Given the role of imaging in detecting extracutaneous disease, guiding treatment selection, and monitoring response, consistent application of evidence-based imaging recommendations supports health equity by promoting timely and standardized evaluation regardless of race, sex, or geographic location, and by facilitating appropriate escalation of care for populations at greatest risk of advanced or multisystem disease.

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Castleman's Disease (Unicentric and Multicentric) (ONC-31.11)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging in individuals with Castleman's Disease	• Either CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast **or** PET/CT (CPT® 78815) • CT Neck with contrast (CPT® 70491) if cervical or supraclavicular involvement • If CT scans were utilized initially and suggested unicentric disease, and surgical resection is being considered, PET/CT (CPT® 78815) can be approved to confirm unicentric disease • If unicentric disease is surgically removed, proceed to surveillance section
Restaging in individuals with Castleman's Disease: • Multicentric disease or surgically unresected unicentric disease on chemotherapy	ONE of the following every 2 cycles: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • PET/CT (CPT® 78815)
ANY of the following in individuals with Castleman's Disease: • Suspected recurrence • Recurrent B symptoms • Rising LDH/IL-6/VEGF levels	ONE of the following: • CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast • PET/CT (CPT® 78815)

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Indication	Medically Necessary Imaging Study
Surveillance in individuals with Castleman's Disease	• CT with contrast of involved areas no more than every 6 months up to 5 years

Background and Supporting Information

Castleman disease (CD) is a heterogeneous group of lymphoproliferative disorders characterized by abnormal lymph node architecture and variable clinical presentation, and is broadly classified into unicentric CD (UCD) and multicentric CD (MCD) (NCCN, 2026; Dispenzieri & Fajgenbaum, 2020). UCD involves a single lymph node region and is typically localized with an indolent clinical course, whereas MCD involves multiple lymph node regions and is associated with systemic inflammatory symptoms, organ dysfunction, and higher morbidity (NCCN, 2026; Hoffmann et al., 2022).

MCD includes several biologically distinct subtypes, including HHV-8–associated MCD, idiopathic MCD (iMCD), and POEMS-associated MCD, each characterized by differing etiologies and clinical behaviors (NCCN, 2026; Dispenzieri & Fajgenbaum, 2020). Disease manifestations in MCD are driven largely by cytokine dysregulation, particularly interleukin-6, and may include fever, weight loss, cytopenias, organomegaly, and fluid accumulation, with severity ranging from indolent disease to fulminant organ failure (van Rhee et al., 2018; NCCN, 2026).

Evidence Discussion

PET/CT is supported as a primary modality for initial staging of Castleman disease because it provides whole-body evaluation to differentiate unicentric from multicentric disease and allows metabolic characterization of lymphadenopathy (van Rhee et al., 2018; Hoffmann et al., 2022). Standardized uptake values on PET/CT may assist in distinguishing Castleman disease from lymphoma, which is critical in avoiding misclassification and ensuring appropriate treatment selection (van Rhee et al., 2018). However, variability in metabolic activity and overlap with other inflammatory or malignant processes may limit specificity, supporting the use of PET/CT as part of a multimodality assessment rather than a standalone diagnostic tool.

Contrast-enhanced CT of the chest, abdomen, and pelvis is supported as an alternative to PET/CT for initial staging and disease assessment, as it provides detailed anatomic evaluation of lymph node involvement and organ disease (NCCN, 2026; Hoffmann et al., 2022). CT allows identification of localized versus systemic disease and is sufficient for staging in many cases; however, it lacks the functional information provided by PET imaging. Concurrent use of CT and PET/CT is not routinely supported, as it does not significantly change management and may increase radiation exposure and healthcare utilization without added clinical benefit (van Rhee et al., 2018).

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In cases where CT suggests unicentric disease and surgical resection is being considered, PET/CT is supported as a confirmatory modality to exclude additional occult sites of disease, thereby preventing under-staging and inappropriate local treatment (NCCN, 2026; Dispenzieri & Fajgenbaum, 2020). This step is particularly important given that treatment differs significantly between unicentric and multicentric disease, with surgery often curative in UCD and systemic therapy required for MCD (NCCN, 2026).

For restaging, surveillance, and evaluation of recurrence, imaging strategies reflect the underlying disease biology. In MCD or unresected UCD undergoing systemic therapy, serial imaging with CT or PET/CT allows monitoring of treatment response and disease progression, including detection of aggressive subtypes such as HHV-8–associated or POEMS-associated MCD (van Rhee et al., 2018; NCCN, 2026). PET/CT is also appropriate for suspected recurrence or for rising biomarkers such as LDH, IL-6, or VEGF, which may indicate active disease. However, for surveillance after treatment, imaging is limited to periodic CT of involved areas, as PET/CT has not demonstrated sufficient incremental benefit in this setting and may increase cost and radiation exposure, aligning with recommendations to avoid routine PET use in surveillance (NCCN, 2026; Hoffmann et al., 2022).

Health Equity Considerations

Castleman disease (CD) is a rare and heterogeneous lymphoproliferative disorder that includes clinically distinct entities such as unicentric Castleman disease (UCD) and idiopathic multicentric Castleman disease (iMCD). Health equity challenges in CD primarily stem from its rarity, protean clinical manifestations, and reliance on advanced diagnostic resources, which contribute to delayed or missed diagnoses across diverse populations. Large multicenter and registry-based studies demonstrate that iMCD frequently presents with systemic inflammation, cytopenias, organomegaly, effusions, and multiorgan dysfunction, often necessitating extensive imaging to establish disease extent and exclude mimicking malignancies (Bustamante et al., 2024; Liu et al., 2022). Diagnostic delays are particularly likely in settings with limited access to subspecialty hematopathology, cross-sectional imaging, and multidisciplinary care, disproportionately affecting patients in resource-constrained or underserved healthcare systems. International cohort data further suggest variation in outcomes by geography and ethnicity, with inferior survival observed in some non-U.S. populations, highlighting the potential impact of systemic differences in access to timely diagnosis, imaging, and disease-directed therapy (Liu et al., 2022).

These inequities have direct implications for imaging utilization in CD. Imaging plays a central role in differentiating unicentric from multicentric disease, assessing extranodal involvement, identifying complications such as serous effusions or organomegaly, and monitoring response to therapy, particularly in iMCD where disease burden and flare activity can be substantial (Bustamante et al., 2024). Patients with severe subtypes

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such as iMCD-TAFRO experience high hospitalization rates and require frequent reassessment for progressive organ involvement, underscoring the importance of consistent, guideline-based imaging strategies to avoid under-staging or delayed recognition of complications (Bustamante et al., 2024). Standardized application of evidence-based imaging recommendations supports health equity by promoting uniform diagnostic evaluation and follow-up, regardless of patient demographics or care setting, and by facilitating early disease characterization that can enable timely referral to specialized centers and appropriate therapy for this complex and potentially life-threatening condition (Liu et al., 2022).

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Procedure Codes Associated With Oncology Imaging (ONC)

Guideline

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Procedure Codes Associated With Oncology Imaging (ONC)

v1.0.2027

The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Description
70460	Computed tomography, head or brain; with contrast material(s)
70470	Computed tomography, head or brain; without contrast material, followed by contrast material(s) and further sections
70486	Computed tomography, maxillofacial area; without contrast material
70487	Computed tomography, maxillofacial area; with contrast material(s)
70490	Computed tomography, soft tissue neck; without contrast material
70491	Computed tomography, soft tissue neck; with contrast material(s)
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70540	Magnetic resonance (eg, proton) imaging, orbit, face, and/or neck; without contrast material(s)
70543	Magnetic resonance (eg, proton) imaging, orbit, face, and/or neck; without contrast material(s), followed by contrast material(s) and further sequences
70553	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material, followed by contrast material(s) and further sequences

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Code	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71550	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s)
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
72126	Computed tomography, cervical spine; with contrast material
72127	Computed tomography, cervical spine; without contrast material, followed by contrast material(s) and further sections
72129	Computed tomography, thoracic spine; with contrast material
72130	Computed tomography, thoracic spine; without contrast material, followed by contrast material(s) and further sections
72132	Computed tomography, lumbar spine; with contrast material
72133	Computed tomography, lumbar spine; without contrast material, followed by contrast material(s) and further sections
72141	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; without contrast material
72142	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; with contrast material(s)
72146	Magnetic resonance (eg, proton) imaging, spinal canal and contents, thoracic; without contrast material
72147	Magnetic resonance (eg, proton) imaging, spinal canal and contents, thoracic; with contrast material(s)

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Code	Description
72148	Magnetic resonance (eg, proton) imaging, spinal canal and contents, lumbar; without contrast material
72149	Magnetic resonance (eg, proton) imaging, spinal canal and contents, lumbar; with contrast material(s)
72156	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; cervical
72157	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; thoracic
72158	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; lumbar
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72193	Computed tomography, pelvis; with contrast material(s)
72195	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s)
72197	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s), followed by contrast material(s) and further sequences
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74150	Computed tomography, abdomen; without contrast material
74160	Computed tomography, abdomen; with contrast material(s)
74170	Computed tomography, abdomen; without contrast material, followed by contrast material(s) and further sections
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing

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Code	Description
74176	Computed tomography, abdomen and pelvis; without contrast material
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
74178	Computed tomography, abdomen and pelvis; without contrast material in one or both body regions, followed by contrast material(s) and further sections in one or both body regions
74181	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s)
74183	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s), followed by with contrast material(s) and further sequences
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
76390	Magnetic resonance spectroscopy
76497	Unlisted computed tomography procedure (eg, diagnostic, interventional)
76498	Unlisted magnetic resonance procedure (eg, diagnostic, interventional)
76536	Ultrasound, soft tissues of head and neck (eg, thyroid, parathyroid, parotid), real time with image documentation

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Code	Description
76641	Ultrasound, breast, unilateral, real time with image documentation, including axilla when performed; complete
76642	Ultrasound, breast, unilateral, real time with image documentation, including axilla when performed; limited
76700	Ultrasound, abdominal, real time with image documentation; complete
76705	Ultrasound, abdominal, real time with image documentation; limited (eg, single organ, quadrant, follow-up)
76770	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), real time with image documentation; complete
76775	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), real time with image documentation; limited
76830	Ultrasound, transvaginal
76856	Ultrasound, pelvic (nonobstetric), real time with image documentation; complete
76857	Ultrasound, pelvic (nonobstetric), real time with image documentation; limited or follow-up (eg, for follicles)
76872	Ultrasound, transrectal
76882	Ultrasound, limited, joint or focal evaluation of other nonvascular extremity structure(s) (eg, joint space, peri-articular tendon[s], muscle[s], nerve[s], other soft-tissue structure[s], or soft-tissue mass[es]), real-time with image documentation
76942	Ultrasonic guidance for needle placement (eg, biopsy, aspiration, injection, localization device), imaging supervision and interpretation
77012	Computed tomography guidance for needle placement (eg, biopsy, aspiration, injection, localization device), radiological supervision and interpretation

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Code	Description
77021	Magnetic resonance imaging guidance for needle placement (eg, for biopsy, needle aspiration, injection, or placement of localization device) radiological supervision and interpretation
77049	Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; bilateral
77084	Magnetic resonance (eg, proton) imaging, bone marrow blood supply
78018	Thyroid carcinoma metastases imaging; whole body
78020	Thyroid carcinoma metastases uptake (List separately in addition to code for primary procedure)
78104	Bone marrow imaging; whole body
78195	Lymphatics and lymph nodes imaging
78300	Bone and/or joint imaging; limited area
78305	Bone and/or joint imaging; multiple areas
78306	Bone and/or joint imaging; whole body
78315	Bone and/or joint imaging; 3 phase study
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78608	Brain imaging, positron emission tomography (PET); metabolic evaluation
78609	Brain imaging, positron emission tomography (PET); perfusion evaluation
78800	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging

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Code	Description
78801	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days
78802	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) , single area (eg, head, neck, chest, pelvis), single day imaging
78804	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, requiring 2 or more days imaging
78811	Positron emission tomography (PET) imaging; limited area (eg, chest, head/neck)
78812	Positron emission tomography (PET) imaging; skull base to mid-thigh
78813	Positron emission tomography (PET) imaging; whole body
78814	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; limited area (eg, chest, head/neck)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh

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Code	Description
78816	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; whole body
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/ detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging
78831	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
78832	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/ detection of pathology, minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
78835	Radiopharmaceutical quantification measurement(s) single area (List separately in addition to code for primary procedure)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography

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Code	Description
93307	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, without spectral or color Doppler echocardiography
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
A9515	Choline c-11, diagnostic, per study dose up to 20 millicuries
A9552	Fluorodeoxyglucose f-18 fdg, diagnostic, per study dose, up to 45 millicuries
A9580	Sodium fluoride f-18, diagnostic, per study dose, up to 30 millicuries
A9587	Gallium ga-68, dotatate, diagnostic, 0.1 millicurie
A9588	Fluciclovine f-18, diagnostic, 1 millicurie
A9591	Fluoroestradiol f 18, diagnostic, 1 millicurie
A9592	Copper cu-64, dotatate, diagnostic, 1 millicurie
A9593	Gallium ga-68 psma-11, diagnostic, (ucsf), 1 millicurie
A9594	Gallium ga-68 psma-11, diagnostic, (ucla), 1 millicurie
A9595	Piflufolastat f-18, diagnostic, 1 millicurie
A9596	Gallium ga-68 gozetotide, diagnostic, (illuccix), 1 millicurie
A9608	Flotufolastat f 18, diagnostic, 1 millicurie
A9616	Gallium ga-68 gozetotide (gozellix), diagnostic, 1 millicurie
A9800	Gallium ga-68 gozetotide, diagnostic, (locametz), 1 millicurie
C9067	Gallium ga-68, dotatoc, diagnostic, 0.01 mci

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Abbreviations for Pelvis Imaging Guidelines

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Abbreviations for Pelvis Imaging Guidelines	
CA-125	cancer antigen 125 test
CT	computed tomography
FSH	follicle-stimulating hormone
GTN	gestational trophoblastic neoplasia
HCG	human chorionic gonadotropin
IC/BPS	interstitial cystitis/bladder pain syndrome
IUD	intrauterine device
KUB	kidneys, ureters, bladder (frontal supine abdomen radiograph)
LH	luteinizing hormone
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging
MSv	millisievert
PA	posteroanterior projection
PID	pelvic inflammatory disease
TA	transabdominal
TSH	thyroid-stimulating hormone

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Abbreviations for Pelvis Imaging Guidelines	
TV	transvaginal
UCPPS	Urologic Chronic Pelvic Pain Syndrome
WBC	white blood cell count

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General Guidelines (PV-1.0)

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Criteria

- A current clinical evaluation since the onset or change in symptoms is required before advanced imaging can be considered. The clinical evaluation should include a relevant history and physical examination including a pelvic and/or urological exam, appropriate laboratory studies, and non-advanced imaging modalities such as plain x-ray or Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or Transvaginal ultrasound (CPT® 76830) and/or Transperineal ultrasound (CPT® 76872).
  - Other meaningful contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms for follow-up visit by an established individual can substitute for a face-to-face clinical evaluation.
- The use of gynecology CPT® codes for pregnant females is not supported. Therefore, transvaginal ultrasound (CPT® 76830) and pelvic ultrasound (CPT® 76856 or CPT® 76857) are considered not medically necessary for those with a positive pregnancy test or known pregnancy. If a pregnancy test is positive, then obstetrical CPT® codes are considered medically necessary.
- Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crest.
- Pelvic imaging begins at the iliac crest and extends to the pubis.
- The uterus, tubes, and ovaries arise out of the pelvis and are considered pelvic organs. If the uterus or adnexa rise out of the pelvic cavity, above the level of the iliac crest or umbilicus on physical exam or on previous imaging, abdominal imaging may be added for the completion of imaging.
- MRI Pelvis without contrast (CPT® 72195) for Defecography is considered investigational/experimental by UHC.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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General Guidelines – Overview (PV-1.1)

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Criteria

- When medically necessary, pregnant females should be evaluated with ultrasound or MRI without contrast to avoid radiation exposure. In carefully selected clinical circumstances, evaluation with CT may be considered medically necessary with careful attention to technique and radiation protection as deemed clinically appropriate.

Ultrasound

- TV ultrasound is the standard modality for imaging; no alternative modality has demonstrated sufficient superiority to justify routine use, and TV ultrasound (CPT® 76830) is the optimal study to evaluate adult female pelvic organ pathology.
- Pelvic ultrasound (complete CPT® 76856, or limited CPT® 76857) is considered medically necessary if it is a complementary study to the TV ultrasound. It may substitute for TV in pediatric individuals or non-sexually active females assigned at birth.
- Transperineal ultrasound (CPT® 76872) is considered medically necessary for cases of suspected urethral abnormalities, urinary incontinence, pelvic prolapse, or vaginal cysts.
- CPT® 76942 is used to report ultrasound imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.

Soft Tissue Ultrasound

- Pelvic wall, buttocks, and penis - CPT® 76857

Scrotal Ultrasound

- See:
  - **Impotence/Erectile Dysfunction (PV-17.1)**
  - **Penis-Soft Tissue Mass (PV-18.1)**
- Ultrasound scrotum and contents - CPT® 76870

3D Rendering with Ultrasound

- 3D Rendering (CPT® 76376 or CPT® 76377)
  - CPT® 76377 (3D rendering requiring image post-processing on an independent work station) or CPT®

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76376 (3D rendering not requiring image post-processing on an independent workstation) in the following clinical scenarios is considered medically necessary:
  - Uterine intra-cavitary lesion when initial ultrasound is equivocal (see **Abnormal Uterine Bleeding (AUB) (PV-2.1)** and **Leiomyoma/Uterine Fibroids (PV-12.1)**)
  - Hydrosalpinges or peritoneal cysts when initial ultrasound is equivocal (see **Complex Adnexal Masses (PV-5.3)**)
  - Lost IUD (inability to feel or see IUD string) with initial ultrasound (see **Intrauterine Device (PV-10.1)**)
  - Uterine anomaly is suspected on ultrasound (see **Uterine Anomalies (PV-14.1)**)
  - Infertility if ultrasound is indeterminate or there is clinical suspicion for intra-cavitary lesion (such as polyp or fibroid), hydrosalpinx, uterine synechia, adenomyosis, or uterine anomalies (see **Initial Infertility Evaluation, Female (PV-9.1)**)
  - For further delineation of the junctional zone in suspected adenomyosis (see **Adenomyosis (PV-4.1)**)
- 3D-4D (CPT® 76376 or CPT® 76377) rendering is considered medically necessary in certain situations of abnormal pregnancy implantation like suspected C-section scar pregnancies, suspected cornual (interstitial) ectopic pregnancy, or to locate an IUD.
- 3D-4D (CPT® 76376 or CPT® 76377) rendering is considered medically necessary for surgical planning with diagnosis of complex CHD in the fetus or for surgical planning of other complex fetal malformations.

Other Ultrasound
- CPT® 93975 Duplex scan (complete) of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study.
- CPT® 93976 Duplex scan (limited) of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study.
- CPT® 93975 and CPT® 93976 should not be reported together during the same session.

CT
- CT is considered not medically necessary for evaluating pelvic anatomy because it is limited due to soft tissue contrast resolution.

MRI
- MRI is considered medically necessary when used as a more targeted study or for individuals allergic to iodinated contrast.
  - MRI Pelvis without contrast (CPT® 72195)

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- MRI Pelvis without and with contrast (CPT® 72197)
- MRI Pelvis with contrast only (CPT® 72196) is rarely performed.

Evidence Discussion (PV-1.1)

- Ultrasonography and magnetic resonance imaging (MRI) are the imaging techniques of choice for the pregnant individual, they should be used prudently and only when use is expected to answer a relevant clinical question (American College of Obstetricians and Gynecologists [ACOG], 2017).
- CT is not generally warranted for evaluating pelvic anatomy because it is limited due to soft tissue contrast resolution. Computed tomography (CT) scans are generally not recommended during pregnancy unless the benefits clearly outweigh the potential risks (American College of Radiology [ACR] & Society for Pediatric Radiology [SPR], 2023). Computed tomography (CT) scan if necessary in addition to ultrasonography or MRI if more readily available for the diagnosis in question, should not be withheld from a pregnant individual. The risk of adverse effects from ionizing radiation should always be weighed against the risk of not performing the procedure and the benefit derived from the procedure (ACR & SPR, 2023).
- Ultrasound is the recommended modality for imaging the female pelvic organs; no alternative modality has demonstrated sufficient superiority to justify routine use (Benacerraf et al., 2015), and transvaginal ultrasound is the optimal study to evaluate adult female pelvic pathology. Transabdominal pelvic ultrasound is a useful complementary study to transvaginal ultrasound and may substitute for transvaginal ultrasound in pediatric individuals or non-sexually active females. The American Institute of Ultrasound in Medicine (AIUM.org) launched an initiative in 2012 "Ultrasound First," which advocates the use of ultrasound examinations before other imaging modalities when the evidence shows that ultrasound imaging is at least equally, if not more, effective for the target anatomic area (Minton & Abuhamad, 2013). This applies particularly to obstetric and gynecologic patients for whom a skillfully performed and well-interpreted ultrasound image usually obviates the need to proceed to additional more costly and complex cross-sectional imaging techniques (Benacerraf et al., 2015).
- Transperineal ultrasound can be useful for cases of suspected urethral abnormalities, urinary incontinence, pelvic prolapse, or vaginal cysts (Yang et al., 2020; Hamed & Mansour, 2017). A study by Yang et al. (2020) confirmed transvaginal or transperineal ultrasound to be a non-invasive and cost-effective modality for diagnosis of urethral and periurethral masses. Vaginal and urethral imaging is limited on transvaginal ultrasound due to the position of the endovaginal probe rendering the vagina out of the field, on computed tomography (CT) due to poor soft tissue discrimination of the vaginal walls and on magnetic resonance imaging (MRI). MRI of the vagina should be done with thin slice thickness and proper choice of the degree of angulation and used MR sequence, otherwise there is limited evaluation of the vagina (Hamed & Mansour, 2017). Transperineal ultrasound is also a dynamic real-time examination, and can

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detect subtle abnormalities that are not seen in static imaging (Hamed & Mansour, 2017).

- Scrotal ultrasound is supported for evaluation of scrotal pain or suspected mass (Wang et al., 2019; Stephenson et al., 2019). The American Urological Association recommends scrotal ultrasound for initial evaluation of unilateral or bilateral scrotal mass suspicious for neoplasm (Stephenson et al., 2019).
- Three-dimensional (3D) rendering with ultrasound can be considered when ultrasound shows suspected uterine anomaly, uterine intra-cavitary lesion, hydrosalpinges or peritoneal cysts (Lakshmy, Rose, & Ramachandran, 2016; Turkgeldi, Urman, & Ata, 2014; Graupera et al., 2015; Sakhel et al., 2013). A study by Laskshmy et al. found 3D ultrasound to be a highly sensitive and specific tool for accurately diagnosing congenital uterine anomalies (Lakshmy, Rose, & Ramachandran, 2016). 3D rendering has shown a high degree of concordance with MRI and laparoscopy for congenital uterine anomalies, and is non-invasive, readily available and relatively cost-effective (Turkgeldi, Urman, & Ata, 2014). Three-dimensional ultrasound is a noninvasive method for evaluation of adnexal pathology (Meng-Hsing et al., 2012). The addition of 3D imaging to ultrasound has been shown to have an accuracy of 80% and a positive predictive value of 95% in the diagnosis of adenomyosis by allowing for detection of an irregular junctional zone (Li et al., 2018). 3D imaging has been added to the Morphologic Uterus Sonographic Assessment (MUSA) features for adenomyosis (modified Delphi procedure) (Harmsen et al., 2022).
- Doppler scan can be of benefit in addition to ultrasound for further evaluation of suspected uterine or ovarian abnormalities. Doppler flow mapping is useful in diagnosing submucosal fibroids and endometrial polyps (Cil et al., 2010). ACOG (American College of Obstetrics and Gynecology) recommended that color Doppler ultrasonography is useful to evaluate the vascular characteristics of adnexal masses (ACOG, 2016a). MRI pelvis is useful in cases such as inconclusive ultrasound for adenomyosis, "MRI is a second-line examination in the diagnosis of internal adenomyosis, mainly after a non-conclusive US evaluation. In addition, MRI can differentiate between the subtypes of adenomyosis." MRI pelvis is also useful for further evaluation of indeterminate adnexal masses. A study by Dirrichs et al. (2022) found MRI to improve sensitivity and specificity of diagnosis of indeterminate adnexal masses detected at TVUS, and use of MRI changed therapeutic management in 34% of cases. MRI can aid in the diagnosis of deep pelvic endometriosis (Macario et al., 2012). MRI pelvis is useful for further evaluation of unexplained pelvis pain when ultrasound evaluation is inconclusive (Maturen et al., 2018). Pelvic MRI is useful for evaluation of fibroids prior to uterine-sparing interventional techniques. "Although a high-quality ultrasonography (US) examination may be sufficient for evaluation in patients with straightforward cases of fibroids (for instance to estimate the size of a dominant fibroid), imaging evaluation is most reliably performed with magnetic resonance (MR) imaging to determine the characteristics, number, size,

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and location of fibroids and to assess for other pathologic conditions such as adenomyosis" (Silberzweig et al., 2016).

- There is currently insufficient data to generate appropriateness criteria for the use of 3D and 4D rendering in conjunction with Obstetrical ultrasound imaging. Per ACOG, proof of a clinical advantage of 3-dimensional ultrasonography in prenatal diagnosis, in general, is still lacking.

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Abnormal Uterine Bleeding (PV-2)

Guideline

Abnormal Uterine Bleeding (AUB) (PV-2.1)
Retained Products of Conception (PV-2.2)
References (PV-2)

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Abnormal Uterine Bleeding (AUB) (PV-2.1)

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Criteria

- Pregnancy test should be done initially if premenopausal.
- If pregnancy test is negative or post menopausal initial evaluation includes ANY or ALL of the following:
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830), D&C and/or endometrial biopsy
- Advanced imaging is considered not medically necessary for Endometrial Intraepithelial Neoplasia or Atypical Endometrial Hyperplasia (EIN-AEH) as imaging has not been found to improve outcomes for this condition.
- In females assigned at birth with postmenopausal bleeding
  - Those with thickened endometrium on ultrasound, those whose ultrasound failed to identify a thin, distinct endometrial strip, and/or those with continued vaginal bleeding should all undergo endometrial biopsy to rule out endometrial carcinoma.
- If biopsy confirms a malignancy, then see the appropriate oncology guideline.
- If ultrasound is equivocal for intracavitary lesion, the following is considered medically necessary:
  - Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) as an add-on to TV ultrasound (CPT® 76830)
  - 3-D Rendering (CPT® 76377 or CPT® 76376) as an add-on
- CT is considered not not medically necessary for evaluating AUB since uterine anatomy is limited due to soft tissue contrast resolution.
  - An abnormal endometrium found incidentally on CT should be referred for TV ultrasound for further evaluation.
- MRI is considered not medically necessary for evaluation of abnormal uterine bleeding. Please see specific Pelvis Imaging sections for MRI indications for ultrasound findings such as adnexal mass or uterine fibroids. See **Adnexal Mass/ Ovarian Cysts (PV-5)** and **Leiomyoma/Uterine Fibroids (PV-12.1)**.

Evidence Discussion (PV-2.1)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for evaluation of abnormal uterine bleeding (American College of Obstetricians and Gynecologists [ACOG], 2012; Robbins et al., 2020). Ultrasound also allows for real-time evaluation with color and power

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Doppler which can help identify vascular flow and distinguish fluid and cysts from soft tissue (Robbins et al., 2020). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure. 3-D Rendering has been shown to a useful adjunct for analysis of suspected lesions the endometrial cavity.

- MRI is not supported as an initial imaging modality for the diagnosis of abnormal uterine bleeding (Robbins et al., 2020). While MRI is accepted as an adjunct modality to ultrasound in cases where ultrasound may not fully characterize a soft tissue abnormality, imaging should be directed by the type of suspected soft tissue abnormality (e.g., adenomyosis, endometriosis, fibroids, and adnexal mass) and is addressed in additional sections of these guidelines. CT is of limited use in the evaluation of abnormal uterine bleeding given its suboptimal evaluation of the soft tissue of female pelvic organs (Robbins et al., 2020).
- In premenopausal females assigned at birth presenting with abnormal uterine bleeding, a pregnancy test should be performed. For those with a positive pregnancy test, imaging with appropriate obstetric ultrasound should be performed.
- Vaginal bleeding is the presenting symptom in 90% of postmenopausal females assigned at birth with endometrial cancer (ACOG, 2018). An endometrial strip of 4mm or less on ultrasound has been found to have a greater than 99% negative predictive value for endometrial cancer (ACOG, 2018). However, this cutoff may be inadequate in Black women, as it missed five-fold more cases than in White women (Doll et al., 2021). Endometrial tissue sampling remains the gold standard for diagnosis of endometrial carcinoma. As such, those with thickened endometrium on ultrasound, those who ultrasound failed to identify a thin, distinct endometrial strip and those with continued vaginal bleeding should all undergo endometrial sampling to rule out endometrial carcinoma (ACOG, 2018).
- The incidence of concurrent endometrial cancer with the diagnosis of Endometrial Intraepithelial Neoplasia or Atypical Endometrial Hyperplasia (EIN-AEH) is approximately 30% to 50% (ACOG, 2023). This makes evaluation for concurrent carcinoma imperative in the diagnosis of EIN-AEH for those considering a fertility-sparing treatment. The most accurate method for diagnosis is hysteroscopic-guided uterine sampling (ACOG, 2023), which has the added benefit of direct visualization of any intrauterine pathology such as endometrial polyps.

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Retained Products of Conception (PV-2.2)

PV.UB.0002.2.A
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Criteria

- For abnormal uterine bleeding and/or pelvic pain with concern for retained products of conception (RPOC):
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is considered medically necessary one time. Repeat US is considered medically necessary for continued symptoms.
  - Color Doppler ultrasonography (CPT® 93975 or CPT® 93976) may be added to ultrasound to aid in diagnosis of RPOC.
  - CT Pelvis with and without contrast (CPT® 72194) OR MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary if US with Color Doppler is equivocal AND further imaging is needed for surgical planning.

Evidence Discussion (PV-2.2)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for evaluation of suspected retained products of conception (RPOC) (Uyeda et al., 2020; Sellmyer et al., 2013). Ultrasound also allows for real-time evaluation with color and power Doppler which can help identify vascular flow within the endometrial complex, which improves the specificity and negative predictive value of detecting RPOC (Uyeda et al., 2020). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure.
- For most cases ultrasound is sufficient for detection of RPOC. For cases where ultrasound is inconclusive additional imaging with MRI or CT may provide additional information to aid in surgical planning (Sellmyer et al., 2013).

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Amenorrhea (PV-3)

Guideline

Secondary Amenorrhea (PV-3.1)
Primary Amenorrhea (PV-3.2)
References (PV-3)

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Secondary Amenorrhea (PV-3.1)

PV.AM.0003.1.A
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Criteria

- Pregnancy test should be done initially.
- If a pregnancy test is positive:
  - Refer to the member's individual coverage policy regarding obstetrical imaging indications and appropriate obstetrical imaging procedural codes. Billing of gynecology codes during pregnancy is not supported.
- If a pregnancy test is negative, further evaluation includes any of the following:
  - FSH, TSH, estradiol, and/or prolactin levels are considered medically necessary depending on clinical suspicion.
  - Serum free and total testosterone and/or DHEAS levels are considered medically necessary if there is evidence of hyperandrogenism.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) for suspected uterine or ovarian pathology are considered medically necessary.
- The results of test(s) above determine the next steps, which include:
  - For suspected adrenal tumor, see **Adrenal Cortical Lesions (AB-16)** in the Abdomen Imaging Guidelines.
  - For suspected pituitary or hypothalamic tumor, see **Pituitary, Sella, Hypothalamus (HD-19)** in the Head Imaging Guidelines.
  - For suspected Asherman's Syndrome, the following are considered medically necessary:
    - Hysterosalpingogram (CPT® 74740), sonohysterosalpingography (CPT® 76831), and/or hysteroscopy if ultrasound is indeterminate for Asherman's syndrome
    - MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) if hysterosalpingogram (CPT® 74740), sonohysterosalpingography (CPT® 76831), or hysteroscopy is indeterminate for Asherman's Syndrome

Background and Supporting Information

- Asherman's syndrome: an acquired condition which refers to having scar tissue in the uterus (Dreisler & Kjer, 2019)

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Primary Amenorrhea (PV-3.2)

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Criteria

- Prior to imaging a history, physical examination and Tanner stage should be evaluated.
- Initial evaluation may include pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) as medically necessary for **ANY** of the following:
  - Normal pubertal development and negative pregnancy test
  - Pelvic exam is indeterminate or unable to be performed
  - Delayed puberty with follicle-stimulating hormone (FSH) or luteinizing hormone (LH) that is elevated for the individual's age and Tanner stage
  - TV ultrasound (CPT® 76830) is considered medically necessary in pediatric individuals who are sexually active or use a tampon and consent to the study.
- If ultrasound defines a uterine or vaginal anomaly, see **Uterine Anomalies (PV-14.1)**.
- For suspected pituitary or hypothalamic tumor, see **Pituitary, Sella, Hypothalamus (HD-19)** in the Head Imaging Guidelines.

Background and Supporting Information

- Evaluation of an individual without a uterus (determined by imaging or examination) may include karyotype and/or testosterone levels.

Evidence Discussion (PV-3)

- The initial work up of amenorrhea should include a physical exam, pregnancy test and hormonal work up. For those with a positive pregnancy test, imaging with obstetric ultrasound should be performed. Hormonal testing can help to further direct imaging (Practice Committee of the American Society for Reproductive Medicine, 2024; Klein, Paradise, & Reeder, 2019; American College of Obstetricians and Gynecologists [ACOG], 2019; ACOG, 2018b).
- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for evaluation of amenorrhea (Practice Committee of the American Society for Reproductive Medicine, 2024; Klein, Paradise, & Reeder, 2019; ACOG, 2019; ACOG, 2018b). Ultrasound also allows for real-time evaluation with color and power Doppler which can help identify vascular flow and distinguish fluid and cysts from soft tissue (Practice Committee of the American Society for Reproductive Medicine, 2024). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure.

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- MRI is supported as an adjunct to inconclusive ultrasound imaging, especially if the ultrasound is suggestive of a congenital uterine or vaginal anomaly (Klein, Paradise, & Reeder, 2019). CT is of limited use in the evaluation of amenorrhea given its suboptimal evaluation of the soft tissue of female pelvic organs.
- For suspected Asherman's syndrome, the gold standard for diagnosis remains hysteroscopy which has the added benefit of allowing for simultaneous treatment of adhesive disease (Dreisler & Kjer, 2019; Tan & Robertson, 2011). However, hysteroscopy carries with it risks of anesthesia and uterine perforation. Hysterosaplingogram (HSG) allows for simultaneous evaluation of tubal patency (Dreisler & Kjer, 2019). Sonohsyterography (SHG) has a high negative predictive value (98%), but only a modest positive predictive value (43%) (Dreisler & Kjer, 2019). MRI may be a useful adjunct to HSG, SHG and hysteroscopy, especially in cases where there is complete obstruction of the endometrial cavity limiting the diagnostic ability of these tests (Dreisler & Kjer, 2019; Tan & Robertson, 2011).

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Adenomyosis (PV-4)

Guideline

Adenomyosis (PV-4.1)
References (PV-4)

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Adenomyosis (PV-4.1)

PV.AD.0004.1.A
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Criteria

- TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary for the initial evaluation of suspected adenomyosis. Duplex Doppler (CPT® 93975 or CPT® 93976) can be added if requested. 3D rendering (CPT® 76376 or CPT® 76377) may be added to ultrasound for further delineation of the junctional zone in suspected adenomyosis.
- MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered a medically necessary second-line imaging option after TV ultrasound if:
  - Diagnosis is inconclusive for adenomyosis after an ultrasound and further delineation would affect management.
  - MRI is needed to guide the treatment of adenomyosis in an individual with an enlarged uterus and coexisting leiomyoma/fibroid following indeterminate ultrasound.
  - Uterine artery embolization is being considered.
    - If MRI is equivocal, MRA Pelvis (CPT® 72198) or CTA Pelvis (CPT® 72191) if requested by or in consultation with the interventional radiologist planning the uterine artery embolization

Background and Supporting Information

Adenomyosis is when endometrial tissue, which normally lines the uterus, moves into the outer muscular walls of the uterus. Adenomyosis is a histologic diagnosis and is suspected by history and physical examination. Ultrasound findings of adenomyosis include heterogeneous myometrium, myometrial cysts, asymmetric myometrial thickness, and subendometrial echogenic linear striations.

Evidence Discussion (PV-4.1)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for evaluation of adenomyosis (Robbins et al., 2020; American College of Obstetricians and Gynecologists, 2012; Bazot & Daraï, 2018; Vannuccini et al., 2018). Ultrasound also allows for real-time evaluation with color and power Doppler which can help identify vascular flow and distinguish fluid and cysts from soft tissue (Robbins et al., 2020). In the presence of features mimicking leiomyomas, Doppler US displaying vessels perpendicular to the endometrial interface, is suggestive of adenomyosis (Bazot & Daraï, 2018).

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Transvaginal ultrasound has a sensitivity of 83.8% and specificity of 63.9% for adenomyosis (Shirin, Chan, & Sobel, 2021; Chapron et al., 2020). The overall diagnostic accuracy of the use of transvaginal ultrasound with color Doppler for adenomyosis is 93.8% (Chapron et al., 2020). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure.

- MRI of the pelvis is a second-line examination in the diagnosis of adenomyosis, mainly after an inconclusive US evaluation (Bazot & Daraï, 2018). MRI pelvis is useful in individuals with coexisting leiomyoma (Bazot & Daraï, 2018). A meta-analysis comparing the diagnostic performance of MRI and transvaginal ultrasound reported that MRI had a pooled sensitivity of 77% and a specificity of 89% (Bazot & Daraï, 2018). The authors concluded that MRI performs more favorably than transvaginal ultrasound in the presence of associated uterine leiomyomas (Bazot & Daraï, 2018).
- The addition of 3D imaging to ultrasound has been shown to have an accuracy of 80% and a positive predictive value of 95% in the diagnosis of adenomyosis by allowing for detection of an irregular junctional zone (Li et al., 2018). 3D imaging has been added to the Morphologic Uterus Sonographic Assessment (MUSA) features for adenomyosis (modified Delphi procedure) (Harmsen et al., 2022).

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Adnexal Mass/ Ovarian Cysts (PV-5)

Guideline

Suspected Adnexal Mass – Initial Evaluation (PV-5.1)
Simple Cysts (PV-5.2)
Complex Adnexal Masses (PV-5.3)
Screening for Ovarian Cancer/Suspected Ovary Cancer (PV-5.4)
References (PV-5)

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Suspected Adnexal Mass – Initial Evaluation (PV-5.1)

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Criteria

- A potential mass is found on exam and/or found incidentally on other imaging
- TV ultrasound imaging (CPT® 76830) is considered the medically necessary initial study of choice.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) can be performed if requested as a complimentary study to the TV ultrasound.
  - Once confirmed, Color Doppler ultrasonography (CPT® 93975 or CPT® 93976) may be considered medically necessary to evaluate the vascular characteristics of adnexal masses.
- MRI Pelvis without contrast (CPT® 72195) OR MRI Pelvis without and with contrast (CPT® 72197; CPT® 72195 if pregnant) is considered medically necessary if ultrasound does not identify the origin of the pelvic mass (adnexal, uterine, or other in etiology).
  - If the mass is unrelated to female pelvic organ anatomy, see **Abdominal Mass (AB-13)** in the Abdomen Imaging Guidelines.
- For O-RADS™ 0 (incomplete evaluation), either repeat ultrasound, OR MRI Pelvis without contrast (CPT® 72195), OR MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary.
  - If pregnant, MRI Pelvis without contrast (CPT® 72195) is considered medically necessary to avoid gadolinium exposure to the fetus.

Background and Supporting Information

- Consultation with or referral to a gynecologic oncologist is recommended for females assigned at birth with an adnexal mass who meet one or more of the following criteria (Andreotti et al., 2020):
  - Postmenopausal with elevated CA-125 level, ultrasound findings suggestive of malignancy, ascites, a nodular or fixed pelvic mass, or evidence of abdominal or distant metastasis (Andreotti et al., 2020).
  - Premenopausal with very elevated CA-125 level, ultrasound findings suggestive of malignancy, ascites, a nodular or fixed pelvic mass, or evidence of abdominal or distant metastasis (Andreotti et al., 2020).
  - Premenopausal or postmenopausal with an elevated score on a formal risk assessment test such as the multivariate index assay, risk of malignancy index, or

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the Risk of Ovarian Malignancy Algorithm or one of the ultrasound-based scoring systems from the International Ovarian Tumor Analysis group (Andreotti et al., 2020).

- O-RADS™ 0 should not be used for masses that are completely visualized but the diagnosis is unclear.
- Simple and Complex Adnexal Cysts
  - Simple cysts are smooth walled and clear without debris.
  - Complex cysts can have solid areas or excrescences, and/or debris in them, greater than 3mm irregular septations, mural nodules with Doppler-detected blood flow, and/or free abdominal/pelvic fluid.
- Suspected Adnexal Mass – Tumor Markers
  - The adnexa include the ovaries, Fallopian tubes, and ligaments that hold the uterus in place.
  - CA-125 is a tumor marker that is useful for the evaluation of adnexal mass:
    - Elevation occurs with both malignant (epithelial cancer) and benign entities (leiomyoma, endometriosis, PID, inflammatory disease such as lupus, and inflammatory bowel disease).
    - Increase in the markers over time occurs with malignancy only
    - Consider tumor markers in individuals with an abnormal ultrasound that is not a simple cyst
  - Other markers include Beta hCG, LDH, and AFP (germ cell tumors) and Inhibin A and B (granulosa cell tumor).

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Simple Cysts (PV-5.2)

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Criteria

- Simple cysts are smooth, thin walled, anechoic, and clear without debris. Simple cysts up to 10 cm in diameter as measured by ultrasound are almost universally benign.
  - Repeat TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary.
    - Follow up according to the below schedule if ≤10 cm.
  - Routine use of 3D rendering (CPT® 76376/CPT® 76377) for evaluation of simple ovarian cysts is considered not medically necessary.

Simple Cyst Follow-Up

Size	Pre-Menopausal	Post-Menopausal
≤3 cm	• None	• None
>3 cm to 5 cm	• None	• Follow-up in 12 months with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary: ◦ If smaller (≥10-15% decrease), no further surveillance ◦ If stable, follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) at 24 months from initial exam ◦ If enlarging (≥10%-15% increase), follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) at 12 and 24 months from initial exam • If there is a change in morphology on follow-up imaging, see **Complex Adnexal Masses (PV-5.3)**

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Size	Pre-Menopausal	Post-Menopausal
>5 cm to ≤10 cm	• Follow-up in 8-12 weeks (proliferative phase if possible) with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary; further follow-up intervals may be adjusted on basis of degree of cyst change.	• Follow-up in 3-6 months with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary; further follow-up intervals may be adjusted on basis of degree of cyst change. • Subsequent follow-up with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary annually and if stable for 2 years or decreasing in size, no further imaging follow-up is needed.

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Size	Pre-Menopausal	Post-Menopausal
>10 cm	• If not excised, US follow-up within 6 months with TV Ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary. • If stable, follow-up ultrasound can be done at 12 and 24 months from initial exam. • If solid component, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary. • If ultrasound equivocal for Simple cyst, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary. • If follow up ultrasound imaging shows changing morphology and/or a vascular component, then MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary.	• If not excised, US follow-up within 6 months with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary. • If stable, follow-up ultrasound can be done at 12 and 24 months from initial exam. • If solid component, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary. • If ultrasound equivocal for simple cyst, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary. • If follow-up ultrasound imaging shows changing morphology and/or a vascular component, then MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary.

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Complex Adnexal Masses (PV-5.3)

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Criteria

- Ultrasound imaging should provide characteristics of the cyst/mass prior to consideration of advanced imaging.
- Complex cysts found on ultrasound have characteristics that include: solid areas or excrescences, and/or debris, may have greater than 3mm irregular septations, and/or mural nodules with Doppler-detected blood flow, and/or free abdominal/pelvic fluid. Complex cysts have an O-RADS™ score of 2 or higher.
- Routine use of 3D rendering (CPT® 76376/CPT® 76377) for evaluation of complex ovarian cysts is considered not medically necessary unless otherwise mentioned in the table below.

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Follow up Complex Adnexal Masses

Condition	Pre-Menopausal	Post-Menopausal
Typical hemorrhagic cyst < 10 cm (O-RADS™ 2)	• If initial ultrasound imaging confirms hemorrhagic cyst ≤5 cm, no further imaging is considered medically necessary • If initial ultrasound imaging confirms hemorrhagic cyst >5 cm but <10 cm, follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) in 8-12 weeks is considered medically necessary. Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830). ◦ If follow-up imaging confirms a hemorrhagic cyst that has not completely resolved or has enlarged, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary. ◦ If stable, follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) is considered medically necessary at 24 months from initial exam.	• Early postmenopausal (<5 years) either of the following is considered medically necessary: ◦ follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) in 2-3 months **OR** ◦ MRI Pelvis without and with contrast (CPT® 72197) • Late postmenopausal (≥ 5 years) hemorrhagic cyst should not occur ◦ MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary.

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Condition	Pre-Menopausal	Post-Menopausal
Hemorrhagic cyst ≥10cm (O-RADS™ 3)	• If ultrasound equivocal for Hemorrhagic cyst, MRI Pelvis without and with contrast (CPT® 72197) • If initial ultrasound imaging confirms a Typical Hemorrhagic cyst ≥10cm ◦ If not excised, consider TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) follow-up within 6 months ▪ If stable, follow-up ultrasound can be done at 12 and 24 months from initial exam ◦ If solid component, MRI Pelvis without and with contrast (CPT® 72197) may be approved ◦ If follow-up ultrasound imaging shows changing morphology and/or a vascular component, then consider MRI Pelvis without and with contrast (CPT® 72197).	• MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary

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Condition	Pre-Menopausal	Post-Menopausal
Typical Endometriomas < 10cm (O-RADS™ 2)	• If ultrasound equivocal for Endometriomas, MRI Pelvis without and with contrast (CPT® 72197) • If initial imaging confirms a Typical Endometrioma, follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830); duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830). ◦ If <10cm and not surgically excised, follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) in 12 months ▪ If stable, follow-up ultrasound can be done at 24 months from initial exam. ◦ If follow-up ultrasound imaging shows changing morphology and/or a vascular component, then consider MRI Pelvis without and with contrast (CPT® 72197).	• If initial ultrasound imaging confirms a typical endometrioma < 10cm, then either the following is considered medically necessary: ◦ Follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) in 2-3 months **OR** ◦ MRI Pelvis without and with contrast (CPT® 72197)
Typical Endometriomas ≥10cm (O-RADS™ 3)	• If initial ultrasound imaging confirms a Typical Endometrioma ≥10cm, the following is considered medically necessary: ◦ If not excised, TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) follow-up within 6 months ▪ If stable, follow-up ultrasound can be done at 12 and 24 months from initial exam. ◦ If solid component, MRI Pelvis without and with contrast (CPT® 72197) may be approved ◦ If follow up ultrasound imaging shows changing morphology and/or a vascular component, then consider MRI Pelvis without and with contrast (CPT® 72197).	• MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary.

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Condition	Pre-Menopausal	Post-Menopausal
Typical Dermoid < 10cm (O-RADS™ 2)	• If initial features are only suggestive for, or if assessment is uncertain, follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) within 3 months is considered medically necessary. • OR • If ultrasound equivocal for Dermoid, MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary. • If initial ultrasound imaging confirms a Dermoid, follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857); and/or TV ultrasound (CPT® 76830); duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be considered medically necessary as an add-on to TV ultrasound (CPT® 76830). ◦ If ≤10 cm, may consider follow-up TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) in 12 months if not surgically excised ▪ If stable, follow-up ultrasound can be done at 24 months from initial exam. ◦ If follow-up ultrasound imaging shows changing morphology and/or a vascular component, then consider MRI Pelvis without and with contrast (CPT® 72197).	• Same as Pre-Menopausal

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Condition	Pre-Menopausal	Post-Menopausal
Typical Dermoid ≥ 10cm (O-RADS™ 3)	• If ultrasound equivocal for Dermoid, MRI Pelvis without and with contrast (CPT® 72197) • If initial ultrasound imaging confirms a Typical Dermoid ≥10cm ◦ If not excised, consider TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856) follow-up within 6 months ▪ If stable, follow-up ultrasound can be done at 12 and 24 months from initial exam. ◦ If solid component, MRI Pelvis without and with contrast (CPT® 72197) may be approved. ◦ If follow-up ultrasound imaging shows changing morphology and/or a vascular component, then consider MRI Pelvis without and with contrast (CPT® 72197).	• Same as Pre-Menopausal
Typical benign extraovarian lesions Hydrosalpinges (Hydrosalpinx) or Peritoneal cysts (O-RADS™ 2)	• If initial imaging confirms hydrosalpinx or peritoneal cysts, follow up imaging is considered not medically necessary.	• If initial imaging confirms hydrosalpinx or peritoneal cysts, follow-up imaging is considered not medically necessary.

Complex and/or solid adnexal mass incompletely evaluated by ultrasound

- Generally, a repeat ultrasound is considered medically necessary (see table above for appropriate time intervals): TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856)
- MRI Pelvis without and with contrast (CPT® 72197, CPT® 72195 if pregnant) one time is considered medically necessary as follows:
  - To follow masses when they cannot be optimally visualized by ultrasound (e.g., suboptimal sonography due to large mass or obese individual)
  - Unexplained change of appearance during ultrasound follow-up

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- Other individual-driven indications such as the application of established risk prediction models (e.g. family history of ovarian cancer), correlation with abnormal serum biomarkers, and/or pelvic symptoms
- Differentiate the origin of pelvic masses that are not clearly of ovarian origin
- O-RADS™ score of 3 with a solid component
- O-RADS™ score of 4 or 5

- For concern for metastatic ovarian malignancy, see **Ovarian Cancer (ONC-21)** in the Oncology Imaging Guidelines.

Background and Supporting Information

O-RADS™ Classification

O-RADS	
O-RADS™ 0	Incomplete Evaluation
O-RADS™ 1	Normal Ovary • No ovarian lesion • Physiologic cyst: follicle ≤3cm or corpus luteum typically ≤3cm
O-RADS™ 2	Almost Certainly Benign • Simple cyst less than 10 cm • Bilocular, smooth cyst • Unilocular, smooth, non-simple cysts (internal echos and/or incomplete septations) • Typical benign ovarian lesions <10cm (hemorrhagic cyst, dermoid cyst, endometrioma) • Typical benign extraovarian lesions (paraovarian cyst, peritoneal inclusion cysts, hydrosalpinx)
O-RADS™ 3	Low Risk • Typical benign ovarian lesions ≥10cm • Uni- or bilocular cyst, smooth, ≥10cm • Unilocular cyst, irregular, any size • Multilocular cyst, smooth, <10cm, Color Score (CS) <4 • Solid lesion, ± shadowing, smooth, any size, CS =1 • Solid lesion, shadowing, smooth, any size, CS 2-3

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O-RADS	
O-RADS™ 4	Intermediate Risk • Bilocular cysts without solid component(s), Irregular, any size, any color score • Multilocular cysts without solid component(s) ◦ Smooth, 10 cm, CS <4 ◦ Smooth, any size, CS 4 ◦ Irregular, any size, any CS • Unilocular cyst with solid component(s) ◦ <4 papillary projections or any solid component(s) not considered a papillary projection, any size • Bl- or multilocular cyst with solid component(s), any size, CS 1-2 • Solid lesion, non-shadowing, smooth, any size, CS 2-3
O-RADS™ 5	High Risk • Unilocular cyst, ≥4 papillary projections, any size, and CS • Bi- or multilocular cyst with solid component(s), any size, CS 3-4 • Solid lesion, ± shadowing, smooth, any size, CS 4 • Solid lesion, irregular, any size, any CS • Ascites and/or peritoneal nodules

Pre-Menopausal – see table above

- For females assigned at birth of reproductive age (pre-menopausal), evaluation may include a pregnancy test (a quantitative hCG may be necessary if an ectopic pregnancy is suspected), CBC, serial hematocrit measurements, and appropriate cultures.
- Symptomatic individuals often require immediate interventions (antibiotics, surgery, and/or expectant management).
- Ultrasound characteristics usually suggest the diagnosis such as ectopic pregnancy, functional cysts, tubo-ovarian abscess (see **Pelvic Inflammatory Disease (PV-7.1)**), hydrosalpinx, dermoid, endometrioma, hemorrhagic cyst, and pedunculated fibroids (see **Leiomyoma/Uterine Fibroids (PV-12.1)**) and direct the treatment.
- An ovarian mass suspicious for metastatic disease (e.g., from breast, uterine, colorectal or gastric cancer) should be evaluated based on the appropriate Oncology Imaging Guidelines.

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Post-Menopausal – see table above

- For post-menopausal females assigned at birth, most pelvic complex cysts or solid masses should be evaluated for surgical intervention and have tumor markers (i.e., CA-125) measured.
- Some for whom the usual management of a pelvic mass would include surgery may be at increased risk for perioperative morbidity and mortality. In such cases, repeat imaging may be a safer alternative than immediate surgery, although the frequency of follow-up imaging has not been determined.
- An ovarian mass suspicious for metastatic disease (e.g., from breast, uterine, colorectal or gastric cancer) should be evaluated based on the appropriate Oncology Imaging Guidelines.

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Screening for Ovarian Cancer/Suspected Ovary Cancer (PV-5.4)

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- See **Ovarian Cancer (ONC-21)** in the Oncology Imaging Guidelines.

Evidence Discussion (PV-5)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for female reproductive organs (American College of Obstetricians and Gynecologists, 2016; Patel-Lippmann et al., 2024). Ultrasound has high sensitivity (>90%) for adnexal pathology (Patel-Lippmann et al., 2024). Ultrasound also allows for real-time evaluation with color and power Doppler which can help identify vascular flow and differentiate solid components (Benacerraf et al., 2015). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access and lack of ionizing radiation exposure. MRI is accepted as an adjunct modality to ultrasound in cases where ultrasound may not fully characterize a soft tissue abnormality due to its superior signal to noise ratio (Patel-Lippmann et al., 2024; Zhang, Dai, & Li, 2023; Strachowski et al., 2023). CT is of limited use in the evaluation of adnexal masses given its suboptimal delineation of adnexal soft tissue (Patel-Lippmann et al., 2024).
- Accurate diagnosis of adnexal pathology is imperative in order to limit invasive interventions for benign lesions (Zhang, Dai, & Li, 2023) and improve preoperative triage to a gynecologic oncologist for high-risk lesions. In order to standardize reporting of adnexal lesions, the American College of Radiology (ACR) has created the Ovarian-Adnexal Reporting and Data-System (O-RADS) (Andreotti et al., 2020). A meta-analysis of 26 studies demonstrated that O-RADS has high sensitivity for detection of malignancy (95%) (Guerriero et al., 2010). A classification of O-RADS US Category 2 has an extremely low risk of malignancy (<1%), while a Category 5 has a high risk of malignancy (≥50%) (Strachowski et al., 2023). For an indeterminate lesion on ultrasound or features concerning for malignancy, adjunct imaging with MRI is supported to aid in preoperative triage.

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Endometriosis (PV-6)

Guideline

Endometriosis (PV-6.1)
References (PV-6)

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Endometriosis (PV-6.1)

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Criteria

- TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary as the first line diagnostic exam for suspected endometriosis.
- MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary as follows:
  - Prior to planned surgery for suspected deep pelvic endometriosis such as rectovaginal endometriosis, deeply infiltrative bladder endometriosis, and cul-de-sac obliteration
  - To characterize complex adnexal masses as endometrioma if ultrasound equivocal (see **Complex Adnexal Masses (PV-5.3)**)
- For known or suspected thoracic endometriosis, see **Pneumothorax/Hemothorax (CH-19.1)** in the Chest Imaging Guidelines.
- For suspected abdominal wall or cesarean section scar endometriosis:
  - Ultrasound is the initial imaging modality of choice.
  - MRI without and with contrast of the suspected area is considered medically necessary if the ultrasound is inconclusive.
    - CT with contrast of the suspected area may be approved if there is a contraindication for MRI, but it is a suboptimal study for the evaluation of endometriosis.

Evidence Discussion (PV-6.1)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound (TVUS) are widely accepted as the initial imaging modality of choice for evaluation of endometriosis (Hudelist et al., 2011; Guerriero et al., 2022; Goncalves et al., 2021). A meta-analysis by Hudelist et al. found transvaginal ultrasound was found to have a sensitivity and specificity of 91 and 98%, respectively, with a positive predictive value of 98% and negative predictive value of 95% (Hudelist et al., 2011). A study by Goncalves et al. compared TVUS done preoperatively to diagnostic laparoscopy for deep and ovarian endometriosis (Goncalves et al., 2021). This study found TVUS to be accurate in identifying all sites of ovarian and deep endometriosis, with significantly higher sensitivity than diagnostic laparoscopy in detecting rectosigmoid endometriosis. Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure.

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- MRI of the pelvis can be useful for cases of suspected deep pelvic endometriosis (Guerriero et al., 2022; Macario et al., 2012). A study by Macario et al. found MRI of the pelvis prior to laparoscopy to have an overall sensitivity of 91.9% and specificity of 91.2% in the preoperative diagnosis of deep pelvic endometriosis with cul-de-sac obliteration (Macario et al., 2012). MRI is also indicated for further evaluation of suspected endometrioma of the ovary if ultrasound is equivocal (Andreotti et al., 2020; Atri et al., 2019). The American College of Radiology (ACR) Appropriateness Criteria for adnexal mass states, "When an adnexal mass is indeterminate on US, either the organ of origin is uncertain or it is unclear whether the mass is benign or malignant, then MRI with intravenous (IV) contrast (if feasible) becomes the modality of choice (Atri et al., 2019)." Per the ACR Appropriateness Criteria, "MRI can readily diagnose typical endometriomas." A study by Dirrichs et al. found MRI to improve sensitivity and specificity of diagnosis for indeterminate adnexal masses found with TVUS (Dirrichs et al., 2022). In this study, MRI changed the management decision in 34% of patients (Dirrichs et al., 2022).
- Ultrasound remains the first-line imaging modality for evaluation of abdominal wall and cesarean section scar endometriosis, given its wide availability and ability to provide real-time assessment without ionizing radiation. Magnetic resonance imaging (MRI) is preferred in cases where ultrasound findings are inconclusive, due to its superior soft tissue contrast and enhanced delineation of lesion extent. Computed tomography (CT) may be considered when MRI is contraindicated or not feasible; however, its use is generally limited by inferior soft tissue characterization and the associated exposure to ionizing radiation (Allen, Rindos, & Mansuria, 2021; Zhao et al., 2026; Rindos & Mansuria, 2017; Khan et al., Jaramillo-Cardoso et al., 2020; Arkoudis et al., 2023).

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Pelvic Inflammatory Disease (PID) (PV-7)

Guideline

Pelvic Inflammatory Disease (PV-7.1)
References (PV-7)

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Pelvic Inflammatory Disease (PV-7.1)

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Criteria

- Clinical examination alone is usually sufficient for confirming the diagnosis of pelvic inflammatory disease. See **Pelvic Pain/Dyspareunia, Female (PV-11.1)** if other causes of pelvic pain are suspected.
- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is considered medically necessary as the initial study for imaging of suspected pelvic inflammatory disease (PID) if diagnosis is uncertain following bimanual pelvic examination and laboratory testing (such as WBC, CRP and ESR, Microscopy of the vaginal secretions, and testing for Neisseria gonorrhoeae and Chlamydia trachomatis) OR for suspected Tubo-Ovarian Abscess (TOA). Color Doppler ultrasonography (CPT® 93975 or CPT® 93976) may be added.
- CT Pelvis with contrast (CPT® 72193) or MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary:
  - If diagnosis is uncertain following examination, laboratory testing, and ultrasound
  - Ultrasound shows extensive abscess formation and further imaging is needed for treatment planning
  - Suspected TOA with inconclusive ultrasound
- If suspected abdominal abscess, see **Abdominal Sepsis/Abscess (AB-3.1)** in the Abdomen Imaging Guidelines.

Background and Supporting Information

PID may be clinically suspected based on findings of abdominal and/or pelvic pain, cervical or vaginal mucopurulent discharge, dyspareunia, inter-menstrual and/or post coital bleeding, fever, low back pain, nausea/vomiting, urinary frequency, cervical motion tenderness, uterine and/or adnexal tenderness on exam.

Laboratory findings may include elevated erythrocyte sedimentation rate, elevated C-reactive protein, lab documentation of cervical infection with N. gonorrheae or C. trachomatis, WBC on saline microscopy of vaginal fluid, and/or endometrial biopsy with endometritis.

Evidence Discussion (PV-7.1)

- Clinical examination and laboratory testing are appropriate in the initial diagnostic testing for suspected pelvic inflammatory disease (PID) (Jaiyeoba & Soper, 2011; Bhosale et al., 2016; Polena et al., 2015). Imaging studies can be helpful when further evaluation is needed and to rule out other differential diagnoses such as ovarian cysts

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or gastrointestinal disease (Jaiyeoba & Soper, 2011; Bhosale et al., 2016; Polena et al., 2015).

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for evaluation of pelvic inflammatory disease (Jaiyeoba & Soper, 2011; Bhosale et al., 2016; Polena et al., 2015; Maturen et al., 2018; Henrichsen et al., 2021). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure. The addition of Power Doppler to ultrasonography has been found to increase sensitivity in the diagnosis of PID (Jaiyeoba & Soper, 2011; Bhosale et al., 2016; Maturen et al., 2018; Henrichsen et al., 2021).
- CT Pelvis or MRI Pelvis can be considered if further imaging is needed following inconclusive ultrasound for diagnosis of PID, suspected tubo-ovarian abscess, or to evaluate for the extent of PID abscess formation for treatment planning (Jaiyeoba & Soper, 2011; Bhosale et al., 2016; Maturen et al., 2018; Henrichsen et al., 2021; Revzin et al., 2015; American College of Obstetricians and Gynecologists, 2016).

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Polyendocrine Metabolic Ovarian Syndrome (PV-8)

Guideline

Polyendocrine Metabolic Ovarian Syndrome (PMOS) (PV-8.1)
References (PV-8)

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Polyendocrine Metabolic Ovarian Syndrome (PMOS) (PV-8.1)

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Criteria

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is considered medically necessary when history, exam, and/or laboratory findings are suspicious for PMOS.
- Laboratory testing to be done prior to advanced imaging: Virilizing hormone levels (Testosterone and DHEAS). Disorders that mimic the clinical features of PMOS should be excluded by measuring TSH, Prolactin, and 17-OHP (hydroxyprogesterone) levels. Others to consider based on the clinical presentation include cortisol levels, ACTH, dexamethasone suppression testing, IGF-1, FSH, LH, estradiol.
- If elevated serum levels of androgens are found and an adrenal etiology is suspected, see **Adrenal Cortical Lesions (AB-16.1)** in the Abdomen Imaging Guidelines.

Background and Supporting Information

- Polyendocrine metabolic ovarian syndrome (PMOS), previously known as polycystic ovarian syndrome (PCOS), is the most common hormonal disorder among females of reproductive age and is one of the leading causes of infertility.
- Diagnostic criteria of polyendocrine metabolic ovarian syndrome (either criteria can be used)
  - Rotterdam Criteria, endorsed by American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin No. 194 – two of the following three criteria are required:
    - Oligo/anovulation
    - Hyperandrogenism
      - Clinical (hirsutism or less commonly male pattern alopecia) or
      - Biochemical (raised FAI (free androgen index) or free testosterone)
    - Polycystic ovaries on ultrasound
      - Defined as an ovary containing 12 or more follicles (or 25 or more follicles using new ultrasound technology) measuring 2 to 9 mm in diameter or an ovary that has a volume of greater than 10 mL on ultrasonography. A single ovary meeting either or both of these definitions is sufficient for diagnosis of polycystic ovaries.

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- 2023 International Evidence-Based Guidelines, endorsed by the Endocrine Society, European Society of Human Reproduction and Embryology (ESHRE), American Society for Reproductive Medicine (ASRM), supported by ACOG
  - For adults, two of the following three criteria are required:
    - Clinical and/or biochemical hyperandrogenism
    - Irregular cycles and ovulatory dysfunction
      - Normal in the first-year post menarche as part of the pubertal transition
      - 1 to less than 3 years post menarche: less than 21 days or greater than 45 days
      - 3 or more years post menarche to perimenopause: less than 21 days or greater than 35 days or less than 8 cycles per year
      - 1 year post menarche: greater than 90 days for any one cycle
      - Primary amenorrhea by age 15 or greater than 3 years post thelarche (breast development)
    - Polycystic ovarian morphology (PCOM) on ultrasound **OR** elevated Anti-Müllerian Hormone (AMH)
      - Follicle number per ovary (FNPO) at least 20 in at least one ovary should be considered the threshold for PCOM in adults.
      - Ovarian volume (OV) at least 10ml or follicle number per section (FNPS) at least 10 in at at least one ovary in adults should be considered the threshold for PCOM if using older technology or image quality is insufficient to allow for an accurate assessment of follicle counts throughout the entire ovary.
  - For adolescents, both of the following criteria are required:
    - Clinical and/or biochemical hyperandrogenism
    - Irregular cycles and ovulatory dysfunction
- Clinical Features of PMOS
  - Hirsutism and male pattern balding consistent with hyperandrogenism
  - Irregular or absent menstrual cycles
  - Subfertility or infertility
  - Psychological symptoms – anxiety, depression, psychosexual dysfunction, eating disorders
  - Metabolic features – obesity, dyslipidemia, diabetes

Evidence Discussion (PV-8)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the modality of choice for evaluation of the ovaries in patients with suspected polyendocrine metabolic ovarian syndrome (PMOS) (American College of Obstetricians and Gynecologists [ACOG], 2018; Dumesic et al., 2015; Teede et al., 2023; Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group,

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2004). Ultrasound allows for real-time evaluation of the pelvic anatomy, has wide availability, fast access, and lack of ionizing radiation exposure. It also allows for follicular count which will help establish the diagnosis of PMOS (ACOG, 2018; Dumesic et al., 2015; Teede et al., 2023; Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group, 2004).

- Laboratory testing may point to other etiology of symptoms and may better direct additional imaging (ACOG, 2018; Dumesic et al., 2015; Teede et al., 2023; Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group, 2004).

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Initial Infertility Evaluation, Female (PV-9)

Guideline

Initial Infertility Evaluation, Female (PV-9.1)
References (PV-9)

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Initial Infertility Evaluation, Female (PV-9.1)

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Criteria

This guideline is not intended for fertility treatment follow-up and management. See individual fertility coverage policy for imaging during active fertility treatment. Some payors do not provide coverage for infertility evaluation and/or treatment.

- A one-time Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is considered medically necessary for initial infertility workup.
  - Repeat ultrasounds or serial ultrasounds are considered not medically necessary for initial infertility workup.
- To evaluate for tubal patency:
  - Hysterosalpingography (HSG) (CPT® 74740) **OR** sonohysterosalpingography (CPT® 76831) is considered medically necessary.
- If ultrasound is indeterminate or there is clinical suspicion for intra-cavitary lesion (such as polyp or fibroid), hydrosalpinx, uterine synechia, adenomyosis, or uterine anomalies, either of the following are considered medically necessary:
  - 3D US imaging (add-on CPT® 76376 or CPT® 76377)
  - US Color Doppler (CPT® 93975 or CPT® 93976)
- Advanced imaging may be considered medically necessary depending on structural anomalies found on ultrasound.
  - For adenomyosis, see **Adenomyosis (PV-4)**.
  - For adnexal mass or ovarian cysts, see **Adnexal Mass/Ovarian Cysts (PV-5)**.
  - For endometriosis, see **Endometriosis (PV-6)**.
  - For leiomyoma/uterine fibroids and other uterine masses, see **Leiomyoma/ Uterine Fibroids and Other Uterine Masses (PV-12)**.
  - For congenital (Müllerian) uterine and vaginal anomalies, see **Congenital Müllerian Uterine and Vaginal Anomalies (PV-14)**.

Evidence Discussion (PV-9)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for evaluation of the female pelvic organs (Vickramarajah et al., 2017; American Institute of Ultrasound in Medicine, Society for Reproductive Endocrinology and Infertility, & American Society of Reproductive Medicine, 2009; Groszmann & Benacerraf, 2016; Practice Committee of the American

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Society for Reproductive Medicine, 2015; American College of Obstetricians and Gynecologists [ACOG], 2019). Ultrasound allows for real-time evaluation, has wide availability, fast access, and lack of ionizing radiation exposure (Vickramarajah et al., 2017). The addition of 3D ultrasound is beneficial in cases when intrauterine abnormalities are suspected (Groszmann & Benacerraf, 2016; Benacerraf, Shipp, & Bromley, 2008; Ples et al., 2018). The diagnostic accuracy of 3D ultrasound is 90% to 95% for uterine anomalies (Groszmann & Benacerraf, 2016). Adding Doppler evaluation provides information about vascularity and tissue perfusion (Groszmann & Benacerraf, 2016; Cil et al., 2010).

- Hysterosalpingography (HSG) or sonohysterosalpingography can be utilized in assessing tubal patency. Sonohysterosalpingography is more operator dependent than HSG, however, both procedures benefit patients in that they can help avoid the more invasive laparoscopy and chromotubation, which carry the risks of surgery and anesthesia (Practice Committee of the American Society for Reproductive Medicine, 2015; ACOG, 2019).

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Intrauterine Device (IUD) and Tubal Occlusion (PV-10)

Guideline

Intrauterine Device (PV-10.1)
Hysteroscopically Placed Tubal Occlusion Device (PV-10.2)
Implantable Contraceptive Devices (PV-10.3)
References (PV-10)

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Intrauterine Device (PV-10.1)

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Criteria

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is considered medically necessary for the following:
  - Abnormal pelvic exam prior to IUD insertion, such as pelvic mass, irregularly shaped uterus, or enlarged uterus
  - Suspected IUD complication:
    - abnormal IUD position
    - uterine perforation
    - severe pain
    - excessive bleeding
    - suspected infection

"Lost" IUD inability to palpate IUD string on pelvic exam, and/or see IUD on speculum exam:

- If unable to palpate, see, or retrieve IUD string on pelvic exam and/or speculum exam, an attempt to retrieve IUD strings with cytobrush or instrumentation of the cervix should be undertaken prior to imaging.
  - TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857); with or without 3-D Rendering (CPT® 76377 or CPT® 76376) is considered medically necessary:
    - If TV and/or Pelvic ultrasound is negative or non-diagnostic, plain x-ray should be performed if pregnancy test is negative.
      - If IUD is not visualized on x-ray, a diagnosis of expulsion can be made.
    - CT Pelvis without contrast (CPT® 72192) or CT Abdomen and Pelvis without contrast (CPT® 74176) or MRI Pelvis without contrast (CPT® 72195) is considered medically necessary when both ultrasound and plain x-ray are equivocal or non-diagnostic as it may be useful to delineate IUD position and relationship to other abdominal organs.
- If pregnancy test is positive:
  - The use of gynecology CPT® codes for pregnant females is not supported. Therefore, TV ultrasound (CPT® 76830) and pelvic ultrasound (CPT® 76856 or CPT® 76857) are considered not medically necessary for those with a positive

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pregnancy test or known pregnancy. If a pregnancy test is positive, then obstetrical CPT® codes are indicated **(General Guidelines (PV-1.0)**).

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Hysteroscopically Placed Tubal Occlusion Device (PV-10.2)

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Criteria

- TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary for:
  - Suspected complication of hysteroscopically placed tubal occlusion device:
    - abnormal tubal occlusion device position
    - uterine perforation
    - severe pain
    - excessive bleeding

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Implantable Contraceptive Devices (PV-10.3)

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Criteria

- If implant is unable to be palpated
  - If implant is radiopaque (contains barium sulphate)
    - Initial imaging should include either ultrasound or x-ray of arm.
    - If thoracic implant migration is suspected, Chest x-ray should be considered.
    - If Chest x-ray is equivocal, CT Chest without or with contrast (CPT® 71250 or CPT® 71260) or CTA Chest (CPT® 71275) is considered medically necessary.
  - If implant is radiolucent
    - Initial imaging should include ultrasound of the arm.
    - MRI Upper Extremity without contrast (CPT® 73218) is considered medically necessary if ultrasound is equivocal.
    - If thoracic implant migration is suspected, MRI Chest without or without and with contrast (CPT® 71550 or CPT® 71552) is considered medically necessary.

Background and Supporting Information

- As of 2019, neither the Essure nor the Adiana tubal occlusion device is in production.
- Currently, the only implant available in the United States is an etonogesterl containing implant. The original version of this implant (Implanon) was released in 2001. This was replaced by an updated implant in 2011 (Nexplanon) which contains barium sulphate, making it radiopaque and easily visualized on x-ray.
- A rare complication of the implant is distant vascular migration to the pulmonary vasculature.

Evidence Discussion (PV-10)

- Transabdominal and transvaginal ultrasounds are the initial imaging methods for locating a malpositioned IUD (de Kroon et al., 2003;Prabhakaran & Chuang, 2011; American College of Obstetricians and Gynecologists [ACOG], 2016; Nowitzki et al., 2015; Sakhel et al., 2013; ACOG, 2017). Ultrasound has the benefits of being widely available, accurate, and free from exposure to ionizing radiation. The addition of 3D image processing to ultrasound is advantageous as it allows for the visualization of the complete IUD, including the shaft and arms, and demonstrates its relationship to the endometrial cavity (Wong et al., 2015; Sakhel et al., 2013; ACOG, 2017).

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- In cases where the ultrasound is non-diagnostic and the pregnancy test is negative, an x-ray should be performed. x-rays are useful as IUDs are radiopaque; if the IUD is not visualized on an x-ray, a diagnosis of expulsion can be made (ACOG, 2016).
- If both ultrasound and x-ray results are equivocal, CT or MRI may be useful to delineate the IUD's position and its relationship to other abdominal organs (Boortz et al., 2012; Guelfguat et al., 2012).

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Pelvic Pain/Dyspareunia, Female (PV-11)

Guideline

Pelvic Pain/Dyspareunia, Female (PV-11.1)
References (PV-11)

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Pelvic Pain/Dyspareunia, Female (PV-11.1)

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Criteria

- This guideline is intended for the work-up of pelvic pain in relation to the female pelvic organs.
  - If there is clinical concern for a non-gynecological cause of pelvic pain please see the most applicable condition-specific guideline (e.g., General Abdomen Imaging, General Peripheral Vascular Disease (PVD) Imaging, General Peripheral Nerve and Neuromuscular Disorder (PNND) Imaging, etc.)
  - History, physical examination, and laboratory data can guide subsequent workup in individuals presenting with pelvic pain.
    - A pregnancy test should be performed in pre-menopausal females.
  - Ultrasound is the initial work up for pelvic pain suspected to originate from the female pelvic organs
    - Pre-menopausal pelvic pain and the pregnancy test is positive
      - See the applicable obstetrical imaging policy.
    - Pre-menopausal pelvic pain and the pregnancy test is negative or the patient is postmenopausal
      - Ultrasound – transvaginal (CPT® 76830) and/or pelvic (CPT® 76856 or CPT® 76857)
      - Duplex Doppler (CPT® 93975 or CPT® 93976) is considered medically necessary if there is an ovarian mass and/or suspicion of ovarian torsion on the initial ultrasound.
      - Duplex Doppler (CPT® 93975 or CPT® 93976) is considered medically necessary for chronic pelvic pain (pelvic pain for 6 months or greater).
  - If ultrasound is indicative of pelvic organ disease, etc.
    - Further imaging as per appropriate section of guidelines (e.g., **Adnexal Mass/ Ovarian Cysts (PV-5)**, **Pelvic Inflammatory Disease (PV-7.1)**, etc.)
  - If initial ultrasound is normal
    - Further evaluation depending on the clinical suspicion may include urological work-up, gastroenterology work-up, laparoscopic evaluation(s).

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- If the initial ultrasound is equivocal for unexplained chronic pelvic pain (pelvic pain for 6 months or greater) and/or above evaluations are non-diagnostic, the following is considered medically necessary:
  - CT Pelvis with contrast (CPT® 72193) **OR**
  - MRI Pelvis without contrast (CPT 72195) or MRI Pelvis with and without contrast (CPT® 72197)

- Dysmenorrhea
  - Primary Dysmenorrhea
    - Empiric treatment with nonsteroidal anti-inflammatories, Hormonal Therapies or non-pharmacologic strategies
    - If failure of empiric treatment, Secondary Dysmenorrhea should be suspected.
  - Secondary Dysmenorrhea
    - Initial evaluation is with ultrasound – transvaginal (CPT® 76830) and/or pelvic (CPT® 76856 or CPT® 76857)
    - Additional work-up depends on the pelvic pathology suspected.
    - For suspected endometriosis, see **Endometriosis (PV-6)**.
    - For suspected adenomyosis, see **Adenomyosis (PV-4).**
    - For suspected leiomyoma/uterine fibroids and other uterine masses, see **Leiomyoma/Uterine Fibroids and Other Uterine Masses (PV-12)**.
- Evaluation for Pelvic Adhesive Disease
  - Initial imaging is an Abdominal ultrasound (CPT® 76700 or CPT® 76705) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) to complete assessment for surgical planning
    - If ultrasound is inconclusive, then MRI Pelvis without contrast (CPT 72195) or MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary for surgical planning.
- Persistent Genital Arousal Disorder/Genito-Pelvic Dysesthesia (PGAD/GPD)
  - Work-up should include detailed history, physical exam, appropriate laboratory exams, and neurogenital testing.
  - Further work-up is dependent on the suspected etiology
    - For Urethral Diverticula, see **Urethral Diverticula (PV-13.2).**
    - For pelvic floor dysfunction, see **Urinary Incontinence/Pelvis Prolapse/ Fecal Incontinence (PV-22)**.
    - For Tarlov Cyst, see **Miscellaneous Spinal Lesions (SP 2.8).**
    - For Pudendal Neuropathy, see **Focal Neuropathy (PN-2.1)**.
    - For Pelvic Congestion Syndrome, see **Pelvic Congestion Syndrome (PVD-13.4)**.

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- Work-up of interstitial cystitis/bladder pain syndrome (IC/BPS) should include history, physical exam, laboratory exam (urinalysis and urine culture), cystoscopy, and measurement of post void residual urine by bladder catheterization.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is then considered medically necessary.
    - CT Pelvis with contrast (CPT® 72193) is considered medically necessary if ultrasound is equivocal for complicated interstitial cystitis/bladder pain syndrome.
- Proctalgia Syndromes
  - Prior to advanced imaging, the evaluation of rectal/perineal pain should include:
    - digital rectal examination (assess for mass, fissures, hemorrhoids, etc.)
    - pelvic examination in females to exclude PID
    - recent flexible sigmoidoscopy or colonoscopy subsequent to the start of reported symptoms to exclude inflammatory conditions or malignancy
  - Endoanal ultrasound (CPT® 76872), MRI Pelvis with and without contrast (CPT® 72197), or CT Pelvis with contrast (CPT® 72193) are medically necessary after the above studies have been performed or if laboratory or clinical information suggest infection, abscess, or inflammation
- MRI Pelvis without contrast (CPT® 72195) for Defecography is considered investigational/experimental by UHC.

Background and Supporting Information

- Dysmenorrhea is pain with the menstrual cycle. It can be divided into primary dysmenorrhea (pain in the absence of pelvic pathology) and secondary dysmenorrhea (pain due to pelvic pathology or recognized medical condition).
- Interstitial Cystitis/Bladder Pain Syndrome (IC/BPS) has an unpleasant sensation (pain, pressure, discomfort), perceived to be related to the urinary bladder. It is associated with lower urinary tract symptoms of more than six weeks duration, in the absence of infection or other identifiable causes.
- Proctalgia syndromes are characterized by recurrent episodes of rectal/perineal pain, and may be due to sustained contractions of the pelvic floor musculature.

Evidence Discussion (PV-11)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for pelvic pain of gynecologic origin (Maturen et al., 2018; Henrichsen et al., 2021; American College of Radiology [ACR], 2016; Steege & Siedhoff, 2014). Ultrasound also allows for real-time evaluation with color and power Doppler which can help identify vascular flow and distinguish fluid and cysts from soft tissue (Maturen et al., 2018; Henrichsen et al., 2021; ACR,

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2016). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure.

- MRI is accepted as an adjunct modality to ultrasound in cases where ultrasound may not fully characterize a soft tissue abnormality due to its superior signal to noise ratio (Maturen et al., 2018; Henrichsen et al., 2021; ACR, 2016).

  CT of the pelvis may demonstrate engorged veins, pelvic fulid, peritoneal thickening, hydrosalpinx or pyosalpinx and tubo-ovarian abscess (Maturen et al., 2018; Henrichsen et al., 2021).
- MRI pelvis, CT pelvis or endoanal ultrasound are appropriate for the evaluation of proctalgia after digital rectal examination, pelvic examination in females and recent endoscopy to exclude inflammatory conditions or malignancy (Wald et al., 2021).
- Often, the history, physical examination, and laboratory data can guide subsequent workup in individuals presenting with pelvic pain. If initial ultrasound is normal, further evaluation may include urological work-up, gastroenterology work-up, or laparoscopic evaluation(s) (American College of Obstetricians and Gynecologists [ACOG], 2020.
  - The differential diagnosis for chronic pelvic pain is extensive. Determining the etiology of pelvic pain is important to plan treatment (ACOG, 2020; ACOG 2019).
- Multiple meta-analyses have been performed regarding the detection of intra-abdominal adhesions by various imaging modalities. Limperg et al. (2021) found that ultrasound has a sensitivity of 95.9%, specificity of 93.1%, a PPV of 60.4% and a NPV of 99.2% for the identification for assessment of periumbilical bowel adhesion. In addition, Gerner-Rasmussen (2019) found an overall accuracy for detecting intra-abdominal adhesions of 76-100% for ultrasound, 79-90% for MRI and 66% for CT. Ultrasound has the benefit of being widely available and lacks exposure to contrast agents. MRI is able to visualize adhesions between viscera, but has a higher false positive rate and over diagnoses adhesions.

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Leiomyoma/Uterine Fibroids and Other Uterine Masses (PV-12)

Guideline

Suspected Uterine Mass (PV-12.0)
Leiomyoma/Uterine Fibroids (PV-12.1)
Endometrial Polyp (PV-12.2)
Asymptomatic Thickened Endometrium (PV-12.3)
Isthmocele (PV-12.4)
References (PV-12)

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Suspected Uterine Mass (PV-12.0)

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Criteria

- A potential mass found on exam and/or found incidentally on other imaging
  - TV ultrasound (CPT® 76830) is considered medically necessary as the initial study.
    - Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary if requested as a complimentary study to the TV ultrasound.
  - Further imaging as per appropriate section of guidelines (e.g., **Adnexal Mass/ Ovarian Cysts (PV-5)**, **Adenomyosis (PV-4.1)**, etc.)

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Leiomyoma/Uterine Fibroids (PV-12.1)

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Criteria

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) are considered medically necessary for any of the following:
  - Suspected leiomyoma with symptoms of pelvic pain, suspected ureteral obstruction secondary to inability to void urine, pelvic pressure and/or abnormal uterine bleeding, and/or an enlarged uterus found on physical exam with a negative pregnancy test (if pre-menopausal).
  - Pre-operative prior to myomectomy
  - Recurrent symptoms such as abnormal bleeding, pain, or pelvic pressure
  - 3-D Rendering (CPT® 76377 or CPT® 76376) and/or Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) if ultrasound is equivocal and intracavitary lesion is suspected, or for surgical planning for myomectomy
  - There is no current evidence to support 3-D Rendering (CPT® 76377 or CPT® 76376) for planning for uterine artery embolization.
- MRI Pelvis and/or Abdomen to determine surgical approach for hysterectomy is considered not medically necessary.
- MRI Pelvis without and with contrast (CPT® 72197) or MRI Pelvis without contrast (CPT® 72195) in the evaluation of leiomyomas is considered medically necessary for the following:
  - Guide the treatment of leiomyoma/fibroid in an enlarged uterus with multiple leiomyoma/fibroid following indeterminate ultrasound when myomectomy is planned
  - Equivocal sonohysterography or panoramic hysteroscopy with suspected submucous leiomyoma and imaging is needed to plan for myomectomy
  - Leiomyoma necrosis is suspected
  - Guide the treatment of leiomyoma/fibroid in an enlarged uterus with multiple leiomyoma/fibroid following indeterminate ultrasound when Radiofrequency Ablation of Leiomyomas is planned
  - Uterine artery embolization is being considered
    - If MRI is equivocal, MRA Pelvis (CPT® 72198) or CTA Pelvis (CPT® 72191) if requested by or in consultation with the interventional radiologist planning the uterine artery embolization
    - There is no evidence to support interval MRI after embolization unless persistent or recurrent symptoms.

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        - The vascular embolization code (CPT® 37243) is inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention.
            - Additional advanced imaging codes are considered not medically necessary during the procedure to complete the intervention.
- If malignancy is suspected, see **Oncology Imaging Guidelines**.
    - MRI Pelvis without and with contrast (CPT® 72197) for suspected leiomyosarcoma is considered medically necessary if one or more of the following ultrasound features **AND** symptoms are present:
        - Ultrasound features suggestive of leiomyosarcoma are:
            - large sized (greater than 8 cm)
            - irregular borders
            - areas of cystic change or necrosis
            - increase in central and peripheral vascularity
            - rapid change in size
        - Symptoms suggestive of leiomyosarcoma would include postmenopausal woman with an new or rapidly enlarging myometrial mass or rapid growth of a uterine mass in a premenopausal patient (increase of 6 weeks gestation size within 1 year).
- CT is considered not medically necessary for evaluating female pelvic anatomy due to its limited soft tissue contrast resolution.

Extrauterine Leiomyomatosis

Extrauterine leiomyomatosis may include: disseminated peritoneal leiomyomatosis (DPL); benign metastasizing leiomyoma (BML); intravenous leiomyomatosis (IVL); and parasitic leiomyoma (PM).

Initial imaging if extrauterine leiomyomatosis is suspected on initial ultrasound

- CT Chest with contrast (CPT® 71260) **AND**
- **EITHER** CT Abdomen and Pelvis with contrast (CPT® 74177) **OR** MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)

Surveillance Imaging

- CT Chest with contrast (CPT® 71260) **AND**
- **EITHER** CT Abdomen and Pelvis with contrast (CPT® 74177) **OR** MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197)
    - Every 3-6 months for the first 3 years

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- Every 6-12 months for years 3-5
- Then every 1-2 years until year 10

For hereditary leiomyomatosis and renal cell cancer, see **Hereditary Leiomyomatosis and Renal Cell Cancer (HLRCC) (PEDONC-2.16)** in the Pediatric Oncology Imaging Guidelines.

Background and Supporting Information

Leiomyomata are also known as "fibroids."

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Endometrial Polyp (PV-12.2)

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Criteria

- TV ultrasound imaging (CPT® 76830) is the medically necessary initial study.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary if requested as a complimentary study to the TV ultrasound.
  - 3-D Rendering (CPT® 76377 or CPT® 76376) is considered medically necessary for further delineation of the intracavitary lesion.
- Hysteroscopy remains the gold standard for diagnosis and treatment of endometrial polyps.
  - Allows for direct visualization, histologic diagnosis and concurrent treatment of the polyp
  - If biopsy confirms a malignancy, then see the appropriate oncology guideline.

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Asymptomatic Thickened Endometrium (PV-12.3)

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Criteria

- Thickened endometrium (>4mm) incidentally discovered in a postmenopausal individual without bleeding
  - Need not routinely trigger evaluation, but individualized assessment, including endometrial sampling, based on patients risk factors is considered medically necessary.
    - If biopsy confirms a malignancy, then see the appropriate oncology guideline.
    - Advanced imaging is considered not medically necessary for Endometrial Intraepithelial Neoplasia or Atypical Endometrial Hyperplasia (EIN-AEH) as imaging has not been found to improve outcomes for this condition.

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Isthmocele (PV-12.4)

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Criteria

Diagnosis of Isthmocele

- Ultrasound (Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830)) and/or contrast-enhanced sonohysterography is supported as the initial imaging study for diagnosis of an isthmocele.
  - There has been no consistently demonstrated benefit to the addition of 3-D imaging in the diagnosis of isthmocele. It is therefore considered not medically necessary.
- MRI Pelvis without and with contrast (CPT® 72197) (MRI Pelvis without contrast (CPT® 72195) if pregnant) should be reserved for complex cases. It may be considered if ultrasound and/or contrast-enhanced sonohysterography is indeterminate for residual myometrial thickness and MRI is needed for surgical planning.

Post-surgical Repair

- Ultrasound and/or contrast-enhanced sonohysterography is supported as the initial imaging post-surgical repair of an isthmocele.
- Routine use of advanced imaging following surgical repair of isthmocele is considered not medically necessary as there is a paucity of evidence that it improves outcomes.
  - MRI Pelvis without and with contrast (CPT® 72197) may be considered if ultrasound and/or contrast-enhanced sonohysterography is indeterminate for residual myometrial thickness and additional imaging will affect treatment plan.

Evidence Discussion (PV-12)

- Transabdominal pelvic and/or transvaginal pelvic ultrasound are widely accepted as the initial imaging modality of choice for uterine fibroids (Sahkel et al., 2013; Benacerraf et al., 2015). Ultrasound also allows for real-time evaluation with color and power Doppler which can help identify vascular flow and distinguish fluid and cysts from soft tissue. 3-D rendering is useful for further evaluation of intracavitary lesions and for surgical planning for myomectomy (Turkgeldi, Urman, & Ata, 2014). Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure.

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- MRI is accepted as an adjunct modality to ultrasound in cases where ultrasound may not fully characterize a soft tissue abnormality due to its superior signal to noise ratio. MRI can be useful for surgical planning for myomectomy, determining degeneration or necrosis of fibroids, and to plan uterine artery embolization or radiofrequency ablation (Deshmukh et al., 2012; Silberzweig et al., 2016; American College of Obstetricians and Gynecologists [ACOG], 2021; Stewart et al., 2023).
- MRI may be considered for suspected leiomyosarcoma in cases where ultrasound features and symptoms are suggestive of this diagnosis (Hindman et al., 2023). The reported prevalence of unsuspected sarcoma at surgery for symptomatic leiomyoma ranges widely, from 0.01% (one in 10 000) to 0.28% (one in 352) (Hindman et al., 2023).
- MRI offers the highest accuracy for characterization of uterine masses before intervention due to improved soft-tissue contrast, larger field of view, diffusion sequences, and multiplanar sequences. For procedural planning, MRI offers better localization of fibroid position in the uterus and can be used to assess viability and arterial supply of fibroids. In the context of preprocedural planning, MRI features have been evaluated for performance in separating leiomyosarcoma from leiomyomas or atypical leiomyomas. MRI features noted in multiple studies as associated with leiomyosarcoma include the following features: intermediate to high signal intensity of the mass at T2-weighted imaging, irregular margins of the uterine mass with the adjacent myometrium, and high signal intensity at high-b value diffusion-weighted imaging and corresponding low signal intensity on apparent diffusion coefficient maps (Hindman et al., 2023).
- MRA or CTA may be used to determine vascular flow to uterine fibroids for embolization planning in cases where MRI is insufficient. Knowledge of the vascular supply for fibroids is crucial for successful embolization of target arteries (Maciel et al., 2017).
- CT is of limited use in the evaluation of pelvic anatomy due to its limited soft tissue contrast resolution (ACOG, 2021).
- Leiomyomatosis encompasses a cluster of distinct clinical entities characterized by the development of multiple leiomyomas at one or more anatomic sites. These include extrauterine forms — disseminated peritoneal leiomyomatosis (DPL), benign metastasizing leiomyoma (BML), intravenous leiomyomatosis (IVL), and parasitic leiomyoma (PM) — as well as hereditary forms such as hereditary leiomyomatosis and renal cell cancer (HLRCC) and Alport syndrome-associated leiomyomatosis. There is currently no clinical consensus on surveillance imaging specific to extrauterine leiomyomatosis (Di Giuseppe et al., 2025). However, given the rare but documented risk of sarcomatous transformation and the need to exclude underlying leiomyosarcoma (Di Giuseppe et al., 2025; Abu-Rustum et al., 2025), common practice includes adapting the current NCCN Guidelines for the surveillance of uterine sarcomas (Abu-Rustum et al., 2025).

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- Isthmocele, also known as uterine niche, cesarean scar defect or uterine, is an indentation at the site of the cesarean scar with a depth of at least 2mm (Sultan et al., 2025; Jordans et al., 2019). This can increase risk of uterine rupture. There is currently no consensus guidelines on optimal treatment for isthmocele.
- Ultrasound is often done as the initial imaging for suspected isthmocele. Ultrasound allows for real-time evaluation with color and power Doppler which can help identify vascular flow and distinguish fluid and cysts from soft tissue. Additional benefits to ultrasound as a first line imaging modality include wide availability, fast access, and lack of ionizing radiation exposure (Benacerraf et al., 2015). The addition of sonohysterography increases the sensitivity and specificity of detection. The addition of 3-D imaging has limited to small, conflicting studies, and additional investigation is needed prior to recommending its use in evaluation of isthmocele (Armstrong et al., 2023; Dominguez et al., 2023).
- The role of advanced imaging in diagnosis and treatment of isthmocele is an emerging area of study and clinical concern. MRI may add additional information but should be reserved for cases where diagnosis remains uncertain after ultrasound imaging.
- There is no current data to support the routine use of advance imaging to reassess repair following surgical resection or repair of isthmocele.

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Periurethral Cysts, Urethral Diverticula, and Vaginal Masses (PV-13)

Guideline

Periurethral Cysts, Skene Duct Cyst, Bartholin's Gland Cysts and Gartner's Duct Cyst (PV-13.1)
Urethral Diverticula (PV-13.2)
Vaginal Masses (PV-13.3)
Vulvar Masses (PV-13.4)
References (PV-13)

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Periurethral Cysts, Skene Duct Cyst, Bartholin's Gland Cysts and Gartner's Duct Cyst (PV-13.1)

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Criteria

- Initial evaluation includes any of the following:
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) and/or Transperineal ultrasound (CPT® 76872) is considered medically necessary.
    - MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for surgical planning when ultrasound is equivocal.

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Urethral Diverticula (PV-13.2)

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Criteria

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) and/or Transperineal ultrasound (CPT® 76872) are medically appropriate for initial evaluation but are not required prior to advanced imaging.
- Urethrography or CT Urethrography (CT Pelvis without and with contrast (CPT® 72194) or CT Pelvis with contrast (CPT® 72193)) is considered medically necessary to evaluate any urethral abnormalities.
- MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for surgical planning.

Background and Supporting Information

Symptomatic infection of congenital periurethral glands can result in urethral diverticula. Symptoms include pain, urinary urgency, frequency of urination, recurrent urinary tract infection, dribbling after urination, or incontinence.

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Vaginal Masses (PV-13.3)

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Criteria

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) and/or Transperineal ultrasound (CPT® 76872) is considered medically necessary for initial evaluation.
- MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for surgical planning.

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Vulvar Masses (PV-13.4)

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Criteria

- Biopsy is the mainstay for vulvar lesions and should be performed if the lesion is atypical, if there is concern for malignancy, if the individual is immunocompromised, if the diagnosis is uncertain, if lesions do not respond to therapy, or if the disease worsens during therapy.
- If the lesion or mass may not be readily biopsied, ultrasound is considered medically necessary for initial evaluation.
- MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary if the ultrasound is inconclusive and additional information is needed for surgical planning.

Background and Supporting Information

The vulva refers to all structures of the external female genitalia. It is bounded anteriorly by the mons pubis, posteriorly by the perineum, and laterally by the labiocrural folds. It contains the following structures: the mons pubis; labia majora; labia minora; clitoris; the vestibular bulbs; and the vulvar vestibule.

Evidence Discussion (PV-13)

Transabdominal, transvaginal and transperineal ultrasound are often utilized as initial imaging for female pelvic anatomy (Desmarais, 2015; Yang et al., 2020; Hamed & Mansour, 2017; Zulfiqar et al., 2021). Ultrasound has the benefit of being widely available, accurate and does not have exposure to ionizing radiation. MRI is useful in cases of equivocal ultrasound imaging or for surgical planning (Desmarais, 2015; Yang et al., 2020; Zulfiqar et al., 2021). Multiple modalities can be used for the detection of urethral diverticula. Transperineal and transvaginal ultrasound can be utilized in detecting urethral diverticula. Ultrasound has the advantage of being readily available, does not require catheterization and lacks exposure to ionizing radiation. However ultrasound is operator dependent and the reported sensitivity for detection of urethral diverticula ranges from <50 to 100% (Greiman, Rolef, & Rovner, 2019). Urethrography can also be used to detect urethral diverticula with a sensitivity of 67-95% but carries the risk of radiation exposure (Greiman, Rolef, & Rovner, 2019). MRI has excellent soft tissue resolution and has a reported sensitivity of 100% for urethral diverticula (Crescenze & Goldman, 2015).

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Congenital Müllerian Uterine and Vaginal Anomalies (PV-14)

Guideline

Uterine Anomalies (PV-14.1)
Vaginal Anomalies (PV-14.2)
References (PV-14)

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Uterine Anomalies (PV-14.1)

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Criteria

- This guideline is intended for congenital uterine anomalies.
- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is considered medically necessary for initial evaluation. 3-D Rendering (CPT® 76377 or CPT® 76376) may be an add-on if uterine anomaly is suspected on ultrasound.
- If ultrasound is indeterminate:
  - Sonohysterosalpingography (CPT® 76831) is considered medically necessary.
- Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is considered medically necessary to evaluate for possible coexisting renal anomalies if a complex uterine anomaly is present.
  - MRI Abdomen without contrast (CPT® 74181) or MRI Abdomen without and with contrast (CPT® 74183) or CT urography (CT Abdomen and Pelvis without and with contrast CPT® 74178) is considered medically necessary for indeterminate renal anomaly on ultrasound.
- An arcuate uterus is considered a normal variant. Therefore, advanced imaging of a known arcuate uterus is considered not medically necessary.
- MRI Pelvis without and with contrast (CPT® 72197) or MRI Pelvis without contrast (CPT® 72195) is considered medically necessary when:
  - Ultrasound is indeterminate for a complex uterine anomaly; **OR**
  - Requested for surgical planning of previously diagnosed uterine anomaly
    - If ultrasound confirms uterine septum, advanced imaging is considered not medically necessary for surgical planning.

Background and Supporting Information

Müllerian anomalies are complex structural anomalies deriving from errors in the embryonic development of the müllerian duct. These may include uterine remnant or agenesis, cervical agenesis, unicornate utereus, bicornuate uterus, uterine didelphys, vaginal septum and/or other complex anomalies. Uterine septum is not a complex uterine anomaly.

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Vaginal Anomalies (PV-14.2)

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Criteria

- This guideline is intended for congenital vaginal anomalies.
- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) and/or Transperineal ultrasound (CPT® 76872) and/or Translabial ultrasound (CPT® 76857) are considered medically necessary for initial evaluation. 3-D Rendering (CPT® 76377 or CPT® 76376) is considered medically necessary as an add-on if vaginal anomaly is suspected on ultrasound.
- MRI Pelvis without and with contrast (CPT® 72197) or MRI Pelvis without contrast (CPT® 72195) is considered medically necessary when:
  - Ultrasound is indeterminate for a complex vaginal anomaly **OR**
  - Requested for surgical planning of previously diagnosed vaginal anomaly

Background and Supporting Information

- Müllerian anomalies are complex structural anomalies deriving from errors in the embryonic development of the müllerian duct. These may include uterine remnant or agenesis, cervical agenesis, unicornate utereus, bicornuate uterus, uterine didelphys, vaginal septum and/or other complex anomalies. Uterine septum is not a complex uterine anomaly.

Evidence Discussion (PV-14)

- Transabdominal and transvaginal ultrasound remain the preferred initial imaging for female pelvic anatomy (Benacerraf et al., 2015). Ultrasound has the benefit of being widely available, accurate and does not have exposure to ionizing radiation, making it an excellent first line modality for the evaluation of Müllerian anomalies. With the addition of 3D imaging, ultrasound has a reported sensitivity as high as 100% for the detection of uterine anomalies (Graupera et al., 2015). MRI is also highly sensitive for the detection of uterine anomalies and is useful in cases of equivocal ultrasound imaging or for surgical planning of known complex malformations (Graupera et al., 2015).
- For detection of congenital anomalies of the kidney and upper urinary tract ultrasound is usually the first line imaging modality because of its wide availability, low cost and lack of ionizing radiation (Ramanathan et al., 2016; Houat et al., 2021). CT or MRI can be utilized for further delineation of the renal anatomy in cases where ultrasound is inconclusive.

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Fetal MRI and Other Pregnancy Imaging (PV-15)

Guideline

Fetal MRI (PV-15.1)
Placenta Accreta/Placenta Accreta Spectrum/Placenta Percreta (PV-15.2)
C-section, Cornual or Interstitial Ectopic Pregnancy (PV-15.3)
Pelvimetry (PV-15.4)
Abnormal Non-Invasive Prenatal Testing (NIPT) and Maternal Malignancy (PV-15.5)
References (PV-15)

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Fetal MRI (PV-15.1)

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Criteria

CPT® Code Guidance
• Fetal MRI (CPT® 74712) [plus CPT® 74713 for each additional fetus]
• Do not report CPT® 74712 and CPT® 74713 in conjunction with CPT® 72195, CPT® 72196, CPT® 72197.
• If only placenta or maternal pelvis is imaged without fetal imaging, use MRI Pelvis (CPT® 72195).

Indications for Fetal MRI

- Fetal MRI (CPT® 74712) [plus CPT® 74713 for each additional fetus] optimally performed after 18 to 22 weeks gestation, is considered medically necessary for assessment of known or suspected fetal abnormalities for counseling, surgical, or delivery planning.
  - There are cases when surgical planning may necessitate imaging earlier than 18 weeks. For those cases where surgery is to be performed prior to 18 weeks and they otherwise meet indications for imaging per this criteria, fetal MRI may be approved.
- 3D-4D (CPT® 76376 or CPT® 76377) rendering can be added for surgical planning with diagnosis of complex CHD in the fetus or for surgical planning of other complex fetal malformations.
- Repeat fetal MRI (CPT® 74712) [plus CPT® 74713 for each additional fetus] is considered medically necessary later in pregnancy for:
  - Delivery or perinatal surgical planning
- Fetal MRI is only considered medically necessary during pregnancy. Imaging should not be performed on non-pregnant individuals.
- Fetal MRI indications include but may not be limited to the following:
  - Brain
    - Congenital anomalies
      - Ventriculomegaly
      - Agenesis of the corpus callosum
      - Abnormalities of the cavum septum pellucidum
      - Holoprosencephaly

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- Posterior fossa anomalies
- Malformations of cerebral cortical development
- Microcephaly
- Solid or cystic masses
- Cephalocele

▪ Screening fetuses with a family risk for brain anomalies
- Tuberous sclerosis
- Corpus callosal dysgenesis
- Malformations of cerebral cortical development

▪ Vascular abnormalities
- Vascular malformations
- Hydranencephaly
- Intra-uterine cerebrovascular accident (CVA)

◦ Spine
▪ Congenital anomalies
- Neural tube defects
- Sacrococcygeal teratomas
- Caudal regression/sacral agenesis
- Syringomyelia
- Vertebral anomalies

◦ Skull, face, and neck
▪ Masses of the face and neck
- Vascular or lymphatic malformations
- Hemangiomas
- Goiter
- Teratomas
- Facial clefts

▪ Airway obstruction
- Conditions that may impact parental counseling, prenatal management, delivery planning, and postnatal therapy

◦ Thorax
▪ Masses
- Congenital pulmonary airway malformations (congenital cystic adenomatoid malformation; sequestration, and congenital lobar emphysema);
- Congenital diaphragmatic hernia
- Effusion
- Mediastinal masses
- Assessment for esophageal atresia

▪ Volumetric assessment of lung

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        - Cases at risk for pulmonary hypoplasia secondary to oligohydramnios, chest mass, or skeletal dysplasias
    - Abdomen, retroperitoneal and pelvis
        - Bowel anomalies such as anorectal malformations, or complex bowel obstructions such as with megacystis microcolon hypoperistalsis syndrome
        - Abdominal wall defect
        - Mass
            - Abdominal-pelvic cyst
            - Tumors (e.g., hemangiomas, neuroblastomas, sacrococcygeal teratomas, and suprarenal or renal masses)
        - Complex genitourinary anomalies (e.g., cloaca, prune belly syndrome)
    - Congenital Heart Disease (CHD)
    - Skeletal dysplasia
    - Multiple malformations
    - Complications of monochorionic twins/TTTS (e.g., laser treatment of twins, demise of one twin, conjoined twins)
    - Any suspected fetal anomaly associated with severe oligohydramnios or anhydramnios

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Placenta Accreta/Placenta Accreta Spectrum/Placenta Percreta (PV-15.2)

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Criteria

- Obstetrical ultrasound is considered medically necessary as the initial imaging modality. Color Doppler (CPT® 93975) Duplex scan (complete) or (CPT® 93976) Duplex scan (limited) is considered medically necessary as an add-on to evaluate vascularity for suspected or confirmed placenta accreta spectrum.
- MRI Pelvis without contrast (CPT® 72195) is considered medically necessary if the ultrasound is indeterminate or advanced imaging is needed for surgical planning.
- MRI Pelvis without contrast (CPT® 72195) is considered medically necessary if only placenta or maternal pelvis is imaged without fetal imaging.

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C-section, Cornual or Interstitial Ectopic Pregnancy (PV-15.3)

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Criteria

- If a cornual (interstitial) ectopic or C-section scar ectopic pregnancy is suspected on ultrasound:
  - 3D rendering (CPT® 76376 or CPT® 76377) and/or Color Doppler (CPT® 93976) is considered medically necessary with ultrasound.
  - MRI Pelvis without contrast (CPT® 72195) is considered medically necessary if ultrasound is inconclusive.

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Pelvimetry (PV-15.4)

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Criteria

- Pelvimetry (CT or MRI Pelvimetry) lacks sufficient evidence to be considered medically necessary. Current recommendations are that further randomized control studies be performed before it is adapted into routine clinical practice.

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Abnormal Non-Invasive Prenatal Testing (NIPT) and Maternal Malignancy (PV-15.5)

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Criteria

- Non-invasive Prenatal Testing (NIPT) is a common screening method to assess the risk of fetal aneuploidy in the antenatal period. Cell-free DNA (cfDNA) of placental origin circulating in the maternal blood is tested, typically by chromosome microarray analysis, for certain aneuploidies. The presence of genomic anomalies originating from a maternal source can confound these results and have also been linked to occult maternal malignancy.
- When found, maternally derived anomalies merit further work-up.
  - Complete work-up to rule out fetal source of anomalous results should be performed.
    - This would include further testing such as detailed fetal anatomy scan, amniocentesis, or chorionic villus sampling (CVS) if applicable.
  - A targeted maternal work-up should be performed.
    - Complete history, physical, and appropriate lab work up (i.e., CBC, peripheral smear, LDH, Liver and renal function testing, appropriate tumor markers) should be performed to better elucidate possible malignant source.
      - If clinical work up reveals a suspected source, targeted imaging depending on suspected source (i.e., mammogram, chest x-ray, liver ultrasound) should be undertaken.
      - If clinical work up does not reveal potential source:
        - Whole Body MRI (CPT® 76498) is considered medically necessary.

Background and Supporting Information

Some tumor markers are less reliable in pregnancy. CA 125, CA 15.3, AFP and SCC Ag can be elevated in normal pregnancy. However, CA19-9, LDH, AMH, CEA and HE-4 are not commonly elevated in pregnancy. These tumor markers can aid in focusing clinical work up. NIPT is typically performed in the first and the early second trimesters. This is prior to physiologic elevation of inhibin B in the third trimester and development of

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hypertensive abnormalities of pregnancy (which can increase LDH), so these markers may be considered in early pregnancy.

Evidence Discussion (PV 15)

- Transabdominal and transvaginal obstetric ultrasound remain the preferred initial imaging for fetal evaluation of the fetus and maternal pelvic anatomy (Saleem, 2014). Ultrasound has the benefit of being widely available and does not have exposure to ionizing radiation.
- Fetal MRI has emerged as an adjunct imaging to fetal ultrasound in cases where the initial ultrasound is unclear or additional information is needed for surgical or delivery planning. It has the benefits of not being limited by maternal body habitus, fetal position, ossification of fetal skull/bones, or oligohydramnios (Saleem, 2014).
- There is much uncertainty surrounding the use of gadolinium in pregnancy. Gadolinium is water-soluble and can cross the placenta, reaching the amniotic fluid and fetal circulation. While the risk of fetal effects of gadolinium remains uncertain, it has been shown to be teratogenic in animal studies. Given these possible fetal risks, the use of gadolinium in pregnancy should be limited. Its use should only be in situations where the benefits clearly outweigh the risks (American College of Obstetricians and Gynecologists [ACOG], 2017).
- MRI can be used as an adjunct to ultrasound if there is suspicion for abnormal placentation. Sensitivity and specificity for placental invasion is comparable between ultrasound and MRI (sensitivity of 88% and sensitivity of 86% for ultrasound and 93% and 94% for MRI) (Poder et al., 2020). MRI has also been associated with both false positive and false negative diagnoses. Hence, a stepwise approach to evaluation, starting with ultrasound, then followed by the use of MRI for equivocal or nondiagnostic ultrasound is supported.
- Ectopic pregnancy is the leading cause of maternal mortality in the first trimester (Ramanathan et al., 2018). Ultrasound remains the initial imaging modality for ectopic pregnancy, but MRI may add additional information, especially in cases of rare implantation-site ectopic pregnancy (e.g., Cesarean Section scar ectopic). MRI is indicated in cases where the ultrasound is nondiagnostic (Ramanathan et al., 2018).
- There is currently insufficient evidence to support the use of imaging pelvimetry (x-ray, CT, or MRI) in delivery planning (Pattinson, Cuthbert, & Vannevel, 2017).
- No prospective large-scale studies have evaluated NIPT and incidental detection on maternal malignancy, hence the specificity and sensitivity of this testing remains unknown. However, a series of retrospective studies report a positive predictive value of NIPT for detection of occult maternal malignancy of over 50%. There are currently no evidence-based guidelines by which to classify a NIPT result as suspicious for malignancy (Saleem, 2014; American College of Radiology [ACR] & Society for Pediatric Radiology [SPR], 2015; Kilcoyne et al., 2017; Reddy et al., 2014; Cahill et al., 2018).

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- If initial work up determines a maternal source of the abnormal NIPT, targeted maternal work up is merited. If targeted work up fails to reveal possible source of abnormal NIPT then additional screening is merited (Cahill et al., 2018; Prayer et al., 2023). Whole body MRI is preferred in pregnancy as it yields the highest diagnostic benefit. MRI also lacks ionizing radiation, making a preferred imaging modality to CT or PET. Gadolinium should be avoided during pregnancy secondary to possible risk to the fetus (Shainker et al., 2021; ACOG 2017; Ramanathan et al., 2018). MRI, however, is susceptible to artifact and may not be achievable by pregnant patients, who may not be able to breath hold and lay supine for long durations (Dibble & Lourenco, 2016; Pattinson, Cuthbert, & Vannevel, 2017).
- Studies have shown that the most common cancers found among those with abnormal NIPT were of hematologic origin, followed by breast and colon cancers.

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Molar Pregnancy and Gestational Trophoblastic Neoplasia (GTN) (PV-16)

Guideline

Molar Pregnancy and GTN (PV-16.1)
References (PV-16)

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Molar Pregnancy and GTN (PV-16.1)

PV.MP.0016.1.A
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Criteria

- Molar pregnancy
  - Ultrasound is the initial medically necessary study.
  - Once diagnosed on an Obstetrical Ultrasound, treatment is usually evacuation.
- Individuals should undergo chest x-ray pre- and post-evacuation.
  - If chest x-ray is positive for metastases, management as per GTN guidelines. See **Gestational Trophoblastic Neoplasia (GTN) (ONC-22.5)** in the Oncology Imaging Guidelines.
- Serum hCG levels are obtained every 1-2 weeks after treatment of molar pregnancy until they normalize.
- For individuals with a molar pregnancy and rising or plateauing hCG levels post evacuation and/or Gestational trophoblastic neoplasia, see **Gestational Trophoblastic Neoplasia (GTN) (ONC-22.5)** in the Oncology Imaging Guidelines.

Evidence Discussion (PV-16)

Ultrasound provides a noninvasive and sensitive method for detecting characteristic placental abnormalities (Soper, 2021).

Pre evacuation chest radiography provides a low risk assessment for pulmonary metastases and guides escalation to cross sectional imaging only when positive, balancing early detection with avoidance of unnecessary radiation and imaging burden (National Comprehensive Cancer Network [NCCN], 2021).

Serial hCG monitoring every 1-2 weeks after evacuation is supported by evidence demonstrating its effectiveness in detecting persistent or malignant disease early, though it requires prolonged surveillance and patient adherence as a tradeoff (Soper, 2021; NCCN, 2021).

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Impotence/Erectile Dysfunction (PV-17)

Guideline

Impotence/Erectile Dysfunction (PV-17.1)
References (PV-17)

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Impotence/Erectile Dysfunction (PV-17.1)

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Criteria

- Imaging depends on the suspected disease and is considered medically necessary as follows:
  - Penile Doppler ultrasound (CPT® 93980) if erectile dysfunction suspected
  - CTA Pelvis with contrast (CPT® 72191) if large vessel vascular insufficiency is suspected following ultrasound
  - Duplex ultrasound (CPT® 93980) to assess penile vasculature in Peyronie's disease
  - If male hypogonadism is suspected, see **Pituitary, Sella, Hypothalamus (HD-19)** in the Head Imaging Guidelines.
- Functional MRI or PET studies are considered not medically necessary for this indication.
- Priapism
  - Penile Doppler ultrasound (CPT® 93980) is considered medically necessary if non-ischemic priapism is suspected.
  - MRI likely does not have a role in the initial diagnosis of priapism given the time sensitive nature of diagnosis and management.
  - In individuals with persistent non-ischemic priapism where an embolization may be necessary, CTA (CPT® 72191) or MRA Pelvis (CPT® 72198) is considered medically necessary.
  - Penile Doppler ultrasound (CPT® 93980) is considered medically necessary post-procedure for ischemic priapism.
  - If individual has priapism >24-48 hours or refractory to treatment, MRI Pelvis without and with contrast (CPT® 72197) or MRI Pelvis without contrast (CPT® 72195) is considered medically necessary.

Evidence Discussion (PV-17)

- Erectile dysfunction (ED) may utilize penile Doppler ultrasound to assess penile vasculature. Ultrasound has the advantages of being able to provide robust information about both cavernous arterial inflow and the veno-occlusive capacity of the penis (Burnett et al., 2022), is readily available, minimally invasive and tolerated well by patients (Varela et al., 2020).
- Advanced imaging for ED or Peyronie's disease with either PET or functional MRI is considered investigational.

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- A penile Doppler ultrasound may be utilized for workup of non-ischemic priapism or post-procedure for ischemic priapism (Bivalacqua et al., 2022). The sensitivity of Doppler ultrasound in localizing an anterior-cavernosal fistula is approximately 100% (Arrichiello et al., 2020).

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Penis-Soft Tissue Mass (PV-18)

Guideline

Penis-Soft Tissue Mass (PV-18.1)
References (PV-18)

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Penis-Soft Tissue Mass (PV-18.1)

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Criteria

- Penile ultrasound (CPT® 76857) is considered medically necessary for initial evaluation soft-tissue lesions of the penis. Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) is considered medically necessary as an add-on.
- If primary penile cancer is suspected, biopsy is considered medically necessary.
  - For further workup of biopsy confirmed penile cancer, see **Cancers of External Genitalia – Initial Work-up/Staging (ONC-24.6)** in the Oncology Imaging Guidelines.
- Peyronie's Disease
  - Ultrasound (CPT® 76857) is considered medically necessary.
  - MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary if ultrasound is equivocal and surgery or injection therapy is being contemplated.

Evidence Discussion (PV-18)

- Soft tissue lesions of the penis can be evaluated with penile ultrasound with doppler imaging as an initial evaluation (Chipollini et al., 2019). Ultrasound allows a readily available, non-invasive option for accurate assessment of the vascular and structural features of the penis while avoiding ionizing radiation.

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Male Pelvic Disorders (PV-19)

Guideline

Male Pelvic Disorders (PV-19.1)
References (PV-19)

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Male Pelvic Disorders (PV-19.1)

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Criteria

- This guideline is intended for the workup of pelvic pain in relation to the male pelvic organs
  - If there is clinical concern for a non-genitourinary cause of pelvic pain please see the most applicable condition-specific guideline (e.g., General Abdomen Imaging, General Peripheral Vascular Disease (PVD) Imaging, General Peripheral Nerve and Neuromuscular Disorder (PNND) Imaging, etc.).
- Chronic Pelvic Pain Syndrome (CPPS)
  - This may include males experiencing chronic perineal pain, bilateral scrotal content pain, penile pain, pelvic pain, or pain with ejaculation. See **Scrotal Pathology (PV 20.1)** for evaluation of scrotal pain as predominant symptom.
  - Work-up includes comprehensive history, physical exam, and laboratory studies as well as cystoscopy, urodynamics, and/or imaging when the diagnosis is unclear.
    - Transabdominal pelvic ultrasound (bladder and prostate [CPT® 76856 or CPT® 76857]) is considered medically necessary as initial imaging.
    - CT Pelvis with contrast (CPT® 72193) OR MRI Pelvis without contrast (CPT® 72195) OR MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary if ultrasound is equivocal or nondiagnostic and alternative clinical conditions are being considered.
- Prostate
  - Prostate Disorders
    - Suspected Benign Prostatic Hypertrophy with obstructive voiding symptoms:
      - Transrectal ultrasound (CPT® 76872) or Pelvis transabdominal ultrasound (bladder and prostate [CPT® 76856 or CPT® 76857]) is considered medically necessary.
    - For prostatitis with urinary retention or suspected abscess any of the following imaging studies are considered medically necessary:
      - Transrectal ultrasound (CPT® 76872) or Pelvis transabdominal ultrasound (bladder and prostate [CPT® 76856 or CPT® 76857])
      - CT Pelvis with contrast (CPT® 72193) or MRI Pelvis without contrast (CPT® 72195) or with and without contrast (CPT® 72197) if ultrasound is equivocal for abscess or mass
  - Prostate Artery Embolization (PAE)

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        - MRA Pelvis (CPT® 72198) or CTA Pelvis (CPT® 72191) is considered medically necessary for evaluation of the pelvic vasculature if:
            - Prostate artery embolization is planned
            - The vascular embolization code (CPT® 37243) is inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention.
                - Additional advanced imaging codes are considered not medically necessary during the procedure to complete the intervention.
- Testicular
    - Hematospermia
        - MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary to evaluate for **ANY** of the following:
            - Age 40 or older
            - Recurrent hematospermia, regardless of age
            - Hematospermia with associated signs or symptoms of disease (e.g., pain, fever, leukocytosis, hematuria), regardless of age
            - Abnormal findings on Transrectal ultrasound
- Rectal
    - Proctalgia Syndromes
        - Prior to advanced imaging, the evaluation of rectal/perineal pain should include **BOTH**:
            - digital rectal examination (assess for mass, prostate, fissures, hemorrhoids, etc.)
            - recent flexible sigmoidoscopy or colonoscopy subsequent to the start of reported symptoms to exclude inflammatory conditions or malignancy
        - Endoanal ultrasound (CPT® 76872), MRI Pelvis without and with contrast (CPT® 72197), or CT Pelvis with contrast (CPT® 72193) is considered medically necessary after the above studies have been performed or if laboratory or clinical information suggest infection, abscess, or inflammation.
    - MRI Pelvis without contrast (CPT® 72195) for Defecography is considered investigational/experimental by UHC.
- Bladder
    - Work-up of interstitial cystitis/bladder pain syndrome (IC/BPS) may include history, physical exam, laboratory exam (urinalysis and urine culture), cystoscopy, and measurement of post void residual urine by bladder catheterization.
        - Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary.

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- CT Pelvis with contrast (CPT® 72193) is considered medically necessary if ultrasound is equivocal for complicated interstitial cystitis/bladder pain syndrome

Background and Supporting Information

- The proctalgia syndromes are characterized by recurrent episodes of rectal/perineal pain, and may be due to sustained contractions of the pelvic floor musculature.

Evidence Discussion (PV-19)

- For individuals with lower urinary tract symptoms suspected to be caused by Benign Prostatic Hypertrophy ultrasound is the modality of choice for evaluation. It allows for assessment of bladder volume and post-void residual as well as intravesical prostatic protrusion (Alexander et al., 2019). Ultrasound is advantageous as it is readily available, effective, and free of ionizing radiation.
- Prostate Artery Embolization is an excepted treatment for the management of lower urinary tract symptoms according to the American Urological Association (Sandhu et al., 2023). Imaging is indicated for further delineation of the pelvic vasculature to aid in preprocedure surgical planning. The accuracy of CTA to identify the Prostate artery has been shown to approximately 97% (Wadhwa & McClure, 2021). MRI angiography has been shown to identify the prostate artery in 76% of cases, has been helpful in identifying malignancy when suspected and does not carry the risk of radiation exposure (Wadhwa & McClure, 2021).
- Transrectal ultrasound is supported for the initial diagnostic imaging for hematospermia (Ogawa et al., 2019). Ultrasound has high sensitivity for detecting abnormalities of the prostate and seminal tract, demonstrating abnormalities in 82-95% of men with hematospermia (Ogawa et al., 2019) . Ultrasound is advantageous as it is readily available, effective, and free of ionizing radiation. It also allows for simultaneous aspiration or biopsy of any lesions detected. MRI is a useful adjunct to ultrasound imaging. CT has limited value in the evaluation of hematospermia due to its limited ability to differentiate structural changes of the prostate and seminal tract and its lack of soft-tissue contrast (Ogawa et al., 2019).
- In individuals with suspected Proctalgia initial evaluation should include a through exam, including digital rectal exam and direct visualization with sigmoidoscopy or colonoscopy to exclude other causes of rectal pain. Clinical history and normal digital rectal exam is often sufficient to make a diagnosis of Proctalgia (Wald et al., 2021).
- The work up for interstitial cystitis/bladder pain syndrome (IC/BPS) should include a careful history, physical and laboratory examination (Clemens et al., 2022). Additional testing such as radiologic imaging should be undertaken only when it will alter the treatment approach (Clemens et al., 2022). Ultrasound may be useful for adjunct diagnosis and has the advantages of being widely available and without ionizing

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radiation (Homma et al., 2020). Additional testing with CT may be appropriate when ultrasound results are inconclusive but bears the risk of ionizing radiation.

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Scrotal Pathology (PV-20)

Guideline

Scrotal Pathology (PV-20.1)
Paratesticular and Spermatic Cord Masses (PV-20.2)
Testicular Microlithiasis (PV-20.3)
References (PV-20)

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Scrotal Pathology (PV-20.1)

PV.SP.0020.1.A
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Criteria

- Scrotal pain or mass
  - Scrotal ultrasound (CPT® 76870) and/or Duplex (Doppler) ultrasound (CPT® 93975 or CPT® 93976) is considered medically necessary for initial evaluation.
  - MRI Pelvis without and with contrast (CPT® 72197) or Tc-99m scrotal scintigraphy (CPT® 78761) is considered medically necessary if ultrasound is inconclusive.
- Scrotal pain and hydrocele with suspicion of hernia
  - See **Inguinal or Femoral Hernia, or Indeterminate Groin Pain (AB-12.1)** in the Abdomen Imaging Guidelines.
- Cryptorchidism/undescended testis in the adult
  - Scrotal ultrasound (CPT® 76870), MRI Pelvis without and with contrast (CPT® 72197), or CT Pelvis with contrast (CPT® 72193)
- Variocele evaluation
  - Scrotal ultrasound and/or Duplex (Doppler) ultrasound (CPT® 76870 and/or CPT® 93975 or CPT® 93976) of the scrotum with color flow mapping in supine and upright positions is considered medically necessary to assess venous reflux into plexus pampiniformis if varicocele suspected (for example, in inguinal hernia evaluation).
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for right-sided varicocele, when there is suspicion for intra-abdominal pathology.

Background and Supporting Information

- The causes of scrotal pain may include torsion, epididymitis, strangulated hernia, segmental testicular infarction, trauma, testicular tumor, and idiopathic scrotal edema (Gerena et al., 2024).

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Paratesticular and Spermatic Cord Masses (PV-20.2)

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Criteria

- Scrotal ultrasound (CPT® 76870) is considered medically necessary as the initial imaging procedure.
  - MRI Pelvis without and with contrast (CPT® 72197), exploration, and biopsy are additional considerations if ultrasound is inconclusive.

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Testicular Microlithiasis (PV-20.3)

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Criteria

- Scrotal ultrasound (CPT® 76870) is considered medically necessary for initial evaluation.
- Annual Scrotal ultrasound (CPT® 76870) follow-up is considered medically necessary only if a risk factor is present which include:
  - family history of germ cell tumor
  - maldescent
  - orchidopexy
  - testicular atrophy
- For personal history of germ cell tumor, see **Testicular, Ovarian and Extragonadal Germ Cell Tumors (ONC-20)** in the Oncology Imaging Guidelines.

Evidence Discussion (PV-20)

Scrotal ultrasound with Doppler is the recommended initial imaging modality for scrotal pain, masses, and suspected paratesticular or spermatic cord pathology because it is noninvasive, widely available, and provides high-resolution anatomic and vascular assessment, while avoiding radiation exposure (American Institute of Ultrasound in Medicine, 2021).

For testicular microlithiasis, evidence shows that ultrasound detection is sensitive but that surveillance confers limited benefit in isolated cases; therefore, follow-up imaging is recommended only in the presence of clinical risk factors to avoid unnecessary imaging, anxiety, and interventions while still enabling early detection in higher-risk populations (Richenberg et al., 2015).

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Fistulae, Abscess, and Pilonidal Cyst (PV-21)

Guideline

Fistula in Ano (PV-21.1)
Abscess (PV-21.2)
Pelvic Fistula (PV-21.3)
Pilonidal Cyst (PV-21.4)
References (PV-21)

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Fistula in Ano (PV-21.1)

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Criteria

- MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary.
  - If MRI cannot be performed, endoscopic ultrasound is superior, and thus preferential, to CT imaging.
  - CT Pelvis with contrast (CPT® 72193) is an inferior study to either of the above and is considered medically necessary only in circumstances in which MRI and endoscopic ultrasound cannot be performed.
- Non-iatrogenic anal fistula located in atypical positions (lateral) suggest the possibility of Crohn's disease. See **Perirectal/Perianal Chron's Disease (AB-23.3)**.

Evidence Discussion (PV-21.1)

- Anorectal fistulas most commonly arise from abscesses that originate in the anal crypts (90%). Physical exam will frequently identify these but advanced imaging is often needed to determine the course of the fistulous tract, its relationship with the sphincteric musculature and associated infection/abscess (Stephenson et al., 2019). Because of its superior resolution, MRI is the preferred modality, followed by endoscopic ultrasound and then CT (Ziech, Felt-Bersma, & Stroker, 2009).
- The accuracy of endoscopic ultrasound versus CT for perianal fistula is 82% versus 24%.

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Abscess (PV-21.2)

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Criteria

- Perirectal Abscess
  - MRI Pelvis without and with contrast (CPT® 72197) is the preferred study.
    - CT Pelvis with contrast (CPT® 72193) is considered medically necessary as an alternative study if desired.
  - For the evaluation of Perianal and Perirectal Disease related to Crohn's Disease, see **Perirectal/Perianal Crohn's Disease (AB-23.3**) in the Abdomen Imaging Guidelines.
- Perineal Abscess
  - Fournier Gangrene
    - Diagnosis commonly made on the basis of clinical and physical exam
    - CT Pelvis, contrast as requested, is considered medically necessary for evaluating extent of disease for surgical planning.
- Vulvar Abscess
  - CT Pelvis, contrast as requested, is considered medically necessary to delineate the extent of a vulvar abscess and evaluate surrounding structures for surgical planning; **OR**
  - MRI Pelvis without and with contrast (CPT® 72197) may also be considered medically necessary for surgical planning.
- For intraabdominal pelvic abscess, see **Abdominal Sepsis (AB-3.1)** in the Abdomen Imaging Guidelines.

Background and Supporting Information

Pelvic infections can take the form of intraperitoneal abscesses or perineal wall infections (Abcarian, 2011).

Evidence Discussion (PV-21.2)

- History and physical can usually identify perineal (perirectal and perianal) abscesses (Abcarian, 2011). Advanced imaging with MRI is preferred for abscess imaging because of its improved resolution. Endorectal ultrasound or CT scan may be useful in certain circumstances (Ziech, Felt-Bersma, & Stroker, 2009; Vogel et al., 2016). Primary treatment is surgical drainage (Ziech, Felt-Bersma, & Stroker, 2009; Abcarian, 2011).

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Pelvic Fistula (PV-21.3)

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Criteria

- History and physical exam (to include pelvic and/or anorectal examination):
  - Rectovesicular Fistula - the following are considered medically necessary:
    - MRI Pelvis with and without contrast (CPT® 72197) **OR**
    - CT Pelvis with contrast (CPT® 72193)
  - Vaginal Fistula
    - Enterovaginal, Colovaginal, Rectovaginal or Anovaginal:
      - Anoscopy and/or proctoscopy
      - Endoanal ultrasound (rarely used)
      - MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary as the initial modality for suspected enterovaginal fistula.
      - CT Pelvis with contrast (CPT® 72193) is considered medically necessary if:
        - MRI is contraindicated OR urgent evaluation of acute diverticulitis OR early postoperative period
    - Urinary Vaginal Fistula (Ureterovaginal, Vesicovaginal, or Urethrovaginal) - the following are considered medically necessary:
      - Cystoscopy
      - CT urography (CT Abdomen and Pelvis without and with contrast CPT® 74178) and/or CT cystography (CT Pelvis without contrast CPT® 72192) **OR**
      - MRI Pelvis with and without contrast (CPT® 72197)

Background and Supporting Information

- A vaginal fistula is an abnormal communication between the vagina and either a portion of the digestive system or the urinary tract
  - Causes of vaginal fistula may include IBD, endometriosis, infection, tumor, radiation, obstetrical trauma and surgical injuries.
  - Symptoms of vaginal fistula-Persistent vaginitis, dyspareunia, perineal dermatitis, foul-smelling vaginal discharge, and/or urinary or fecal incontinence.
- A rectovesicular fistula is an abnormal communication between the rectum and the bladder.
  - Causes of rectovesicular fistula may include chronic infection, cancer, diverticulitis, IBD, radiation and surgical injuries.

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- Symptoms of rectovesicular fistula-Bubbles in the urine, brown or cloudy urine, blood in the urine, painful urination, recurrent urinary tract infection, and/or abdominal pain

Evidence Discussion (PV-21.3)

- MRI has been established as a method of delineating vaginal fistulas. This is secondary to its excellent soft tissue resolution, allowing identification of acute inflammatory changes, post-surgical fibrosis, neoplastic tissue and abscesses (Tonolini, 2019). It also has the benefit of lacking ionizing radiation, but may have limited access as compared with CT. MRI is also contraindicated by the presence of metallic foreign body or MRI-incompatible devices, such as some pacemakers (Tonolini, 2019). Studies have shown a positive predictive value of 92% for delineation of anorectal vaginal fistulas (VanBuren et al., 2018).
- CT can also be utilized in the visualization of fistulas (Tonolini, 2019; Levy et al., 2021). It does have lower contrast resolution than MRI and does carry the risk of ionizing radiation (Tonolini, 2019). It may be beneficial in emergent situations given the wide availability or in situations where an MRI is contraindicated. CT-urography/ cystography is also a mainstay in evaluation of the urinary tract and can be utilized to evaluate urinary vaginal fistulas (Tonolini, 2019).

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Pilonidal Cyst (PV-21.4)

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Criteria

- Advanced imaging is considered not medically necessary for pilonidal cyst disease.
  - History and physical exam are sufficient for diagnosis of pilonidal cyst.
  - Advanced imaging has not been shown to improve outcomes for pilonidal cysts.
- If other underlying etiologies are suspected, refer to appropriate guidelines:
  - For suspected osteomyelitis, see **General Infection/Osteomyelitis (MS-9.1)** in the Musculoskeletal Imaging Guidelines
  - For abdominal fistulae, see **Fistulae (AB-48)** in the Abdomen Imaging Guidelines.
  - For suspected spinal dysraphism, see **Cutaneous Indications to Suspect Occult Spinal Dysrpahism (PEDSP-4.2)** in the Pediatric Spine Imaging Guidelines.

Evidence Discussion (PV-21.4)

- Pilonidal cysts most frequently arise in the natal cleft, the groove between the buttocks overlying the sacral area. Asymptomatic disease usually does not require any treatment. Acute and chronic infections can be evaluated sufficiently with history and physical alone (Johnson et al., 2019).

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References (PV-21)

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Urinary Incontinence/ Pelvic Prolapse/Fecal Incontinence (PV-22)

Guideline

Urinary Incontinence – Initial Imaging (PV-22.1)
Urinary Incontinence – Further Imaging (PV-22.2)
Pelvic Prolapse (PV-22.3)
Fecal Incontinence (PV-22.4)
References (PV-22)

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Urinary Incontinence – Initial Imaging (PV-22.1)

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Criteria

- Initial imaging, associated with other evaluations, are considered medically necessary as follows:
  - Non-Neurogenic Incontinence
    - Measurements of post void residual urine by Bladder ultrasound (CPT® 51798) OR Bladder catheterization
    - In addition to post void residual volume determination, screening for UTI should be considered.
  - Neurogenic Incontinence
    - Ultrasound urinary tract (CPT® 76770 or CPT® 76775)

Background and Supporting Information

Urinary incontinence can be stress, urgency, or mixed; neurogenic or non-neurogenic; and complicated or uncomplicated. Neurogenic incontinence can occur from cerebral, spinal, or peripheral neurological diseases.

Evidence Discussion (PV-22.1)

- Measurement of postvoid residual urine using bladder ultrasonography or catheterization is beneficial as part of the initial evaluation for urinary incontinence because it helps identify incomplete bladder emptying and differentiate overflow or voiding dysfunction (American College of Obstetricians and Gynecologists [ACOG], 2014; ACOG, 2015). Urinalysis is useful to screen for urinary tract infection prior to further testing or treatment (ACOG, 2014; ACOG, 2015). These modalities provide clinically useful, low-risk assessment that can reduce unnecessary advanced testing. Although, catheterization carries small risks of discomfort and infection, and ultrasound may be operator dependent (ACOG, 2015).
- In neurogenic incontinence, urinary tract ultrasound is used for ongoing evaluation to detect upper tract changes and prevent renal complications and offers a noninvasive, radiation-free method (Chung et al., 2019).

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Urinary Incontinence – Further Imaging (PV-22.2)

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Criteria

- CT Abdomen and Pelvis, contrast as requested, or CT Pelvis, contrast as requested, is considered medically necessary for any of the following:
  - Abnormality on ultrasound that requires further evaluation
  - Complicated incontinence
    - Failed conservative treatment
    - Pain or dysuria
    - Hematuria
    - Recurrent infection
    - Previous radical pelvic surgery
    - Suspected fistula
    - Suspected mass
    - Previous pelvic or prostate irradiation
  - Suspected fistulae
  - Detecting ectopic ureters if ultrasound is non-diagnostic
  - Pre-operative planning for complicated incontinence when ordered by or in consultation with the operating physician
- For neurogenic urinary incontinence, see **Red Flag Indications (SP-1.2)** and **Myelopathy (SP-7.1)** in the Spine Imaging Guidelines and **Mild Cognitive Impairment (MCI) and Dementia - MRI/CT (HD-8.1)** and **Normal Pressure Hydrocephalus (NPH) (HD-8.4)** in the Head Imaging Guidelines.

Evidence Discussion (PV-22.2)

- When initial evaluation identifies abnormalities or when clinical features suggest complicated incontinence, additional imaging can clarify structural pathology such as fistula, mass, or upper urinary tract involvement that may alter management (American College of Obstetricians and Gynecologists [ACOG], 2015; ACOG, 2014).
- Indications such as hematuria, recurrent infection, prior pelvic surgery or irradiation, or persistent symptoms after conservative therapy reflect higher pretest probability of significant disease and support the use of cross-sectional imaging to improve diagnostic accuracy and preoperative planning (ACOG, 2015). Although CT adds radiation exposure and contrast-related risks, its targeted use in these higher-risk

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scenarios provides a favorable benefit to harm balance by avoiding missed diagnoses and guiding definitive management (ACOG, 2015; Chung et al., 2019).

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Pelvic Prolapse (PV-22.3)

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Criteria

- Transvaginal (TV) ultrasound (CPT® 76830) and/or Transperineal ultrasound (CPT® 76872) is considered medically necessary as the initial study of choice.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) is considered medically necessary if requested as a complimentary study.
- Urodynamic testing may be helpful if there is incontinence with a stage II or greater prolapse or voiding dysfunction.
- MRI Pelvis (CPT® 72195 or CPT® 72197) is considered medically necessary for the following:
  - Pelvic floor anatomy and pelvic organ prolapse evaluations if exam and TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) are equivocal; **OR**
  - Pre-operative planning for complex organ prolapse when ordered by or in consultation with the operating physician; **OR**
  - Persistent incontinence following surgery
- Mesh and Graft complications
  - Diagnostic evaluation for mesh and graft complications may include colonoscopy, cystoscopy, and/or urodynamics.
  - Transvaginal (TV) ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857), CT Abdomen and/or Pelvis, contrast as requested, MRI Pelvis without contrast or without and with contrast (CPT® 72195 or CPT® 72197) are considered medically necessary depending on the mesh and graft complication.
- Sacral osteomyelitis may be a complication of sacrocolpopexy. MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary for lower back pain and/or suspected sacral osteomyelitis after this procedure.
- MRI (MRI Pelvis without contrast CPT® 72195) for Defecography is considered investigational/experimental by UHC.

Evidence Discussion (PV-22.3)

- The mainstay of evaluation of pelvic organ prolapse remains clinical pelvic examination. This allows for direct evaluation of prolapse and calculation prolapse quantification (American College of Obstetricians and Gynecologists [ACOG], 2019; Barbier et al., 2023).
- Pelvic floor ultrasound demonstrates strong correlation with POP-Q staging (Li et al., 2025; Gao et al., 2020). Ultrasound is useful for measurement of postvoid residual in

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those that have urinary symptoms (Barbier et al., 2023). Ultrasound also allows for real-time evaluation, has wide availability, fast access, and lack of ionizing radiation exposure.

- MRI has been shown to have excellent soft tissue delineation. If circumstances were clinical exam and ultrasound are equivocal, MRI may provide additional information for conditions such as enterocele, sigmoidocele, and intussusception (Barbier et al., 2023).
- Complications related to mesh and graft placement in pelvic floor surgery are diverse in nature (ACOG, 2017). Work-up for suspected complication is complex and may include a diverse range of diagnostic procedures such as radiologic imaging, cystoscopy, and colonoscopy. Surgical meshes have variable visibility (Gavlin et al., 2020). Given the varied nature of this these complications modality of imaging should be tailored to suspected complication.
- A known rare complication of sacrocolpopexy is sacral osteomyelitis. In cases of suspected osteomyelitis, MRI is the preferred imaging as it has a very high sensitivity for detection infection, especially in early stages (Gavlin et al., 2020).

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Fecal Incontinence (PV-22.4)

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For fecal incontinence, see **Fecal Incontinence (AB-21.5)** in the Abdomen Imaging Guidelines.

MRI Pelvis without contrast (CPT 72195) for Defecography is considered investigational/ experimental by UHC.

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Patent Urachus (PV-23)

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Patent Urachus (PV-23.1)
References (PV-23)

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Patent Urachus (PV-23.1)

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Criteria

- Drainage from the umbilicus, redness around umbilicus, abdominal pain, or urinary tract infection from persistent fetal connection between the bladder and the umbilicus:
  - Ultrasound (CPT® 76856 or CPT® 76857 and/or CPT® 76700 or CPT® 76705) or voiding cystourethrography (VCUG) (CPT® 74455) is considered medically necessary for suspected patent urachus.
  - CT Pelvis with contrast (CPT® 72193) or MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary if the ultrasound is equivocal or if additional imaging is needed for surgical planning if there is a suspected urachal carcinoma or other urachal abnormality.

Background and Supporting Information

A patent urachus (connecting bladder to umbilicus) can manifest as redness around or drainage from the umbilicus, abdominal pain, or urinary tract infections (Villavicencio et al., 2016).

Evidence Discussion (PV-23)

- If patent urachus is suspected, ultrasound can be diagnostic without exposing the individual to radiation (Buddha, Menias, & Katabathina, 2019; Das et al., 2020).

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Bladder Mass (PV-24)

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Bladder Mass (PV-24.1)
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Bladder Mass (PV-24.1)

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Criteria

- Bladder masses incidentally found on other imaging (ultrasound, cystoscopy, or KUB):
  - CT Pelvis without contrast (CPT® 72192) for suspected bladder stone is considered medically necessary if initial imaging is equivocal or if surgery is planned.
  - CT Pelvis without contrast (CPT® 72192) is considered medically necessary for suspected bladder diverticuli.
- See **Oncology Imaging Guidelines** for biopsy confirmed or suspected malignancy.

Background and Supporting Information

- Symptoms of bladder mass may include hematuria, urgency, frequency, chronic urinary infection, obstruction or urinary retention (Dighe, Bhargava, & Wright, 2011; Shelmerdine et al., 2017; Hughes et al., 2020).
- Bladder masses may be found incidentally on initial imaging such as ultrasound, cystoscopy or KUB (Kidney, Ureter and Bladder x-ray).

Evidence Discussion (PV-24.1)

- CT has a higher sensitivity than ultrasound for bladder stones (Hughes et al., 2020).

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Ureteral and/or Bladder Trauma or Injury (PV-25)

Guideline

Ureteral and/or Bladder Trauma or Injury (PV-25.1)
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Ureteral and/or Bladder Trauma or Injury (PV-25.1)

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Criteria

- Abdominal and/or Pelvic ultrasound (CPT® 76700 and/or CPT® 76856) is considered medically necessary if requested.
- CT cystography (CT Pelvis without contrast (CPT® 72192)) is considered medically necessary for suspected bladder injury.
- CT Abdomen and Pelvis with contrast (CPT® 74177) OR CT Abdomen and Pelvis with and without contrast (CPT® 74178) is considered medically necessary if:
  - Suspected iatrogenic/operative injury **OR**
  - Blunt trauma and suspected bladder or ureteral injury with one or more of the following (see **Blunt Abdominal Trauma (AB-10.1)** in the Abdomen Imaging Guidelines):
    - Abdominal pain or tenderness
    - Pelvic or femur fracture
    - Hematocrit <30%
    - Hematuria
    - Non-examinable individual (e.g., intoxicated, less than fully conscious, Glasgow Coma Scale Score >13, etc.)
    - Evidence of abdominal wall trauma or seat-belt sign
    - Rapid deceleration injury

Background and Supporting Information

Bladder trauma: CT cystography- CT Pelvis without contrast allowing the radiologist or Urologist to instill contrast to r/o bladder injury and/or perforation.

Ureteral injury: “Iatrogenic ureteral injuries can occur during gynecologic, obstetric, urologic, colorectal, general, or vascular surgery; gynecologic surgery accounts for more than half of all iatrogenic injuries (Morey et al., 2020).“

Evidence Discussion (PV-25)

- Ultrasound can performed for suspected ureteral and/or bladder trauma. It may aid in triage of injuries and may lead to immediate surgical intervention rather than additional imaging. However, it has lower sensitivity compared to CT, particularly in genitourinary injury (Chan et al., 2006).

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- For individuals with suspected bladder injury retrograde cystography is appropriate (Morey et al., 2021). CT cystography has a reported 95-100% sensitivity and specificity for the diagnosis of bladder rupture (Shyu et al., 2020; Chan et al., 2006). It has the benefits of being widely available and accurate, but does have exposure to ionizing radiation.
- Those presenting with suspected ureteral injury CT of the abdomen and pelvis is appropriate for evaluation of the complete urinary tract. Imaging with contrast is preferred for evaluation of as it has higher sensitivity for detecting concurrent visceral organ and vascular injuries (Shyu et al., 2020). Urogram is helpful in further evaluation of the ureters as it may show contrast extravasation from the ureter or partial or complete ureteral obstruction (Ramchandani & Buckler, 2009; Morey et al., 2020).

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Gender Affirmation Surgery; Pelvic (PV-26)

Guideline

Gender Affirmation Surgery; Pelvic (PV-26.1)
References (PV-26)

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Gender Affirmation Surgery; Pelvic (PV-26.1)

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Criteria

- Preoperative imaging is considered medically necessary as outlined below. Some health plans do not provide coverage for gender affirmation surgery.
- Preoperative imaging
  - Metoidioplasty
    - Preoperative imaging is considered not medically necessary.
  - Phalloplasty
    - Muscular flaps used for neophallus creation are generally obtained from anterior lateral thigh (pedicled flap) or forearm (radial free flap).
      - For planned radial free flap, upper extremity CT angiography (CPT® 73206) of anticipated donor site (unilateral) for evaluation of perforator anatomy
      - For planned anterior lateral thigh flap, bilateral lower extremity CT angiogram (CPT® 73706)
      - If iodinated contrast allergy, MRA (contrast as requested)
  - Vaginoplasty
    - Preoperative imaging is considered not medically necessary.
- Postoperative complications
  - Doppler ultrasound is considered medically necessary when:
    - Monitoring of flap perfusion after phalloplasty for suspected vascular insufficiency
  - CT Abdomen and Pelvis OR CT Pelvis (contrast as requested - CPT® 74176, CPT® 74177, CPT® 74178, CPT® 72192, CPT® 72193, or CPT® 72194) is considered medically necessary for suspected postoperative complications.
    - Complications after surgery may include hematoma, seroma, abscesses, fistula, urinary tract injury, etc. (see **Ureteral and/or Bladder Trauma or Injury (PV-25.1)** for ureteral and/or bladder injury).
  - MRI Pelvis with and without contrast (CPT® 72197) is considered medically necessary for:
    - Suspected fistula
    - Non diagnostic CT scan AND further imaging is needed for treatment planning

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Background and Supporting Information

- Metoidioplasty is a procedure using clitoral hypertrophy and clitoral release to form masculine-appearing external genitalia.
- Phalloplasty includes the creation of a neophallus using muscular flaps.
- Vaginoplasty refers to the surgical creation of a vulva and vaginal canal.

Evidence Discussion (PV-26)

- CT angiography is indicated for preoperative evaluation for phalloplasty in order to map size, location and course of the vasculature (Stowell, Horowitz, & Thomas, 2020; Annen et al., 2020). CTA has been found to have high accuracy in perforator detection (sensitivity of 96-100% and specificity of 95-100% in studies investigating abdominal perforators), short time for image acquisition and high reproducibility. It however does carry the risk of ionizing radiation and exposure to iodinated contrast (Ono et al., 2017).
- Doppler ultrasound allows for monitoring of vascular perfusion of the neophallus after phalloplasty (Stowell, Horowitz, & Thomas, 2020; Stowell et al., 2019). Ultrasound is readily available and does not carry risk of ionizing radiation.
- CT allows for fast and accurate identification of common postoperative complications such as abscess, hematoma and seroma. CT angiography aids in the diagnosis of arterial or venous thrombosis as well as identification of arterial bleeding in the setting of hemorrhage. CT does carry the risk of ionizing radiation and iodinated contrast allergy.
- MRI is the preferred modality for suspected fistula given its superior soft tissue delineation in these cases (Hassan, Sun, & Jha, 2021).

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Procedure Codes Associated with Pelvis Imaging

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Procedure Codes Associated with Pelvis Imaging

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Procedure Codes Associated with Pelvis Imaging

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MRI	CPT®
MRI Pelvis without contrast	72195
MRI Pelvis with contrast (rarely used)	72196
MRI Pelvis without and with contrast	72197
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Pelvis	72198

CT	CPT®
CT Abdomen and Pelvis without contrast	74176
CT Abdomen and Pelvis with contrast	74177
CT Abdomen and Pelvis without and with contrast	74178
CT Pelvis without contrast	72192
CT Pelvis with contrast	72193
CT Pelvis without and with contrast	72194
CT Guidance for Needle Placement (Biopsy, Aspiration, Injection, etc.)	77012
CT Guidance for and monitoring of Visceral Tissue Ablation	77013

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CT	CPT®
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT®
CTA Abdomen and Pelvis	74174
CTA Pelvis	72191

Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Urinary Bladder Residual Study	78730
Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram)	78740
Testicular Scan – Vascular Flow and Delayed Images	78761
Radiopharmaceutical Imaging of Lymphatic System	78195
Radiopharmaceutical Localization Imaging Limited area	78800
Radiopharmaceutical Localization Imaging Whole Body	78802

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Nuclear Medicine	CPT®
Radiopharmaceutical Localization Imaging SPECT	78803

Ultrasound	CPT®
Ultrasound, pelvic (nonobstetric), complete	76856
Ultrasound, pelvic transvaginal	76830
Ultrasound, pelvic (nonobstetric), limited or follow-up	76857
Ultrasound, scrotum and contents	76870
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study	93975
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study	93976
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete	93978
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; limited	93979
Duplex scan of arterial inflow and venous outflow of penile vessels; complete	93980
Duplex scan of arterial inflow and venous outflow of penile vessels; limited study	93981

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Abbreviations for Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines

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Abbreviations for Peripheral Nerve Disorders Imaging Guidelines	
AIDS	acquired immunodeficiency syndrome
ALS	amyotrophic lateral sclerosis
CIDP	chronic inflammatory demyelinating polyneuropathy
CNS	central nervous system
CPK	creatinine phosphokinase
CT	computed tomography
EMG	electromyogram
LEMS	Lambert-Eaton myasthenic syndrome
MG	myasthenia gravis
MRI	magnetic resonance imaging
MRN	magnetic resonance neurography
MRS	magnetic resonance spectroscopy
NCV	nerve conduction velocity
NTOS	neurogenic thoracic outlet syndrome
PET	positron emission tomography

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Abbreviations for Peripheral Nerve Disorders Imaging Guidelines	
PNS	peripheral nervous system
PNST	peripheral nerve sheath tumor
POEMS	polyneuropathy, organomegaly, endocrinopathy, M-protein, skin changes

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General Guidelines (PN-1.0)

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Criteria

- A pertinent clinical evaluation is required before advanced imaging can be considered. The clinical evaluation should include a pertinent history and physical examination, including a neurological examination (since the onset or change in symptoms), appropriate laboratory studies, non-advanced imaging modalities, and electromyography/nerve conduction (EMG/NCV) studies. Other meaningful technological contact (telehealth visit, telephone call or video call, electronic mail or messaging) since the onset or change in symptoms, by an established individual can serve as a pertinent clinical evaluation.
- Nerve conduction studies are often normal early in the disease course with changes occurring from 1 to 4 weeks after symptom onset in the majority of individuals. This will be taken into consideration on a case-by-case basis in regards to the EMG/NCV requirement in each section requirement of the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.
- If imaging of peripheral nerves is medically necessary, ultrasound is the preferred modality for superficial peripheral nerves. MRI may be used for imaging deep nerves such as the lumbosacral plexus or nerves obscured by overlying bone such as the brachial plexus or for surgical planning. CT is limited to cases in which MRI is contraindicated.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Evidence Discussion (PN-1.0)

- Electromyography (EMG) and nerve conduction velocity (NCV) studies are useful in establishing the origin of peripheral nerve pathology and in guiding further diagnostic evaluation. Needle EMG following traumatic nerve injury may detect denervation of muscles that do not seem clinically affected. The optimal time to

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search for denervation changes is 10 to 14 days after the injury. Needle EMG may show residual innervation to paralyzed muscles. Follow-up EMG and NCV studies may demonstrate early evidence of re-innervation or evolving abnormalities that objectively demonstrate the temporal course of peripheral nerve pathology (Chichkova & Katzin, 2010).

- For superficial peripheral nerves, ultrasound has significantly higher resolution than MRI. In terms of expense, safety, and noninvasiveness, ultrasound has clear advantages over MRI, and the few comparative reports available confirm the value of ultrasound as an initial imaging choice (Walker, 2017).
- Advantages of ultrasound over MRI for detecting peripheral nerve pathology include lower cost, rapidity of examination, higher spatial resolution, imaging of the nerve in continuity, and ease of side-to-side comparisons. Ultrasound may better detect subtle changes in nerve caliber. This is important because peripheral nerve pathology is often fusiform in shape and can extend along the length of the nerve without greatly altering its cross-section area. MRI frequently misses multifocal (71%) and occasionally single pathologies (Zaidman et al., 2013).
- Advantages of MRI over ultrasound include superior contrast between tissues, imaging of structures that are deep or surrounded by bone, and tissue characterization using multi-sequence analysis and IV contrast (Zaidman et al., 2013).
- There is greater accuracy (96%) of diagnoses in cases of peripheral nerve sheath tumor, traumatic neuroma or neuropathy, idiopathic mono-neuropathy or plexopathy, fibrosis of nerves, nerve compression caused by ganglion or synovial cysts or any other soft tissue structures, non-neural soft tissue tumors, intra-neural granulomas, and vasculitis with ultrasound than MRI (Alkhalifah, 2023).

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Focal Neuropathy (PN-2)

Guideline

Focal Neuropathy (PN-2.1)
References (PN-2)

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Focal Neuropathy (PN-2.1)

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Criteria

Focal Disorder	EMG/NCV Initially?	Advanced Imaging
Carpal Tunnel Syndrome	YES	• When EMG/NCV and clinical findings are equivocal **AND** only when requested for pre-operative planning, MRI Upper Extremity Joint (Wrist) without contrast (CPT® 73221) is considered medically necessary.
Median Neuropathy other than Carpal Tunnel Syndrome	YES	After EMG/NCV, **ONE** of the following is considered medically necessary for cases of diagnostic uncertainty or pre-operative planning: • MRI Upper Extremity Joint (Elbow or Wrist) without contrast (CPT® 73221) **OR** • MRI Upper Extremity Other Than Joint (Forearm or Hand) without contrast (CPT® 73218) For radiculopathy, see **Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma (SP-3)** in the Spine Imaging Guidelines.
Ulnar Neuropathy	YES	After EMG/NCV, only **ONE** of the following is considered medically necessary if requested for surgical consideration: • MRI Upper Extremity Joint (Elbow or Wrist) without contrast (CPT® 73221) **OR** • MRI Upper Extremity Other Than Joint (Forearm or Hand) without contrast (CPT® 73218)

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Focal Disorder	EMG/NCV Initially?	Advanced Imaging
Radial Neuropathy	YES	• MRI Upper Extremity Other Than Joint (Arm or Forearm) without contrast (CPT® 73218) when surgery is being considered • MRI Upper Extremity Other Than Joint (Arm or Forearm) without and with contrast (CPT® 73220) if there is a suspicion of a nerve tumor such as a neuroma
Radial Neuropathy Notes: Leads to wrist drop with common sites of entrapment at the inferior aspect of the humerus (Saturday night palsy) or the forearm (posterior interosseous syndrome). Entrapment of the nerve at the wrist (Wartenberg syndrome or handcuff palsy) typically spares motor involvement and results only in sensory changes. Trauma or fractures of the humerus, radius, or ulna can damage the radial nerve.		
Pudendal Neuropathy	NO	• **Documented concern specifically for pudendal neuropathy, pudendal neuralgia, or pudendal entrapment**: MRI Pelvis without contrast (CPT® 72195) **OR** MRI Pelvis without and with contrast (CPT® 72197) ◦ If there is a contraindication to MRI **and** the above documented concern is present, then **ONE** of the following is considered medically necessary: ▪ CT Pelvis without contrast (CPT® 72192) ▪ CT Pelvis with contrast (CPT® 72193) ▪ CT Pelvis without and with contrast (CPT® 72194) • For all other pelvic concerns, see the following Pelvic Imaging Guidelines (as indicated): ◦ **Pelvic Pain/Dyspareunia Female (PV-11.1)** ◦ **Impotence/Erectile Dysfunction (PV-17.1)** ◦ **Male Pelvic Disorders (PV-19.1)** ◦ **Scrotal Pathology (PV-20.1)**

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Focal Disorder	EMG/NCV Initially?	Advanced Imaging
Pudendal Neuropathy Notes: Causes pain, sexual dysfunction, or sensory change in the genitals, perineum, and perianal region. May be caused by trauma, recurrent injury from exercise such as cycling, pelvic tumors and masses, or after viral infection (e.g., post-herpetic neuralgia).		
Sciatic Neuropathy	YES	• MRI Pelvis without contrast (CPT® 72195) • CT Pelvis without contrast (CPT® 72192) is **NOT** routinely considered medically necessary due to lack of soft tissue contrast. ◦ It should only be performed in the rare circumstance of contrast allergy and/or contraindication to MRI such as pacemaking device.
Sciatic Neuropathy Notes: May be caused by trauma to the gluteal area with hematoma, injection palsy, hip or pelvic fractures, or hip replacement (arthroplasty). **Piriformis Syndrome** involves entrapment of the sciatic nerve at the sciatic notch in the pelvis by a tight piriformis muscle band. Concerns for piriformis syndrome should be imaged according to the sciatic neuropathy criteria.		
Femoral Neuropathy	NO	• MRI Pelvis without contrast (CPT® 72195)
Femoral Neuropathy Notes: May occur as a complication of pelvic surgery in females or those on anticoagulants with retroperitoneal bleeding, or as a mononeuropathy in diabetics		

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Focal Disorder	EMG/NCV Initially?	Advanced Imaging
Meralgia Paresthetica	NO	• MRI Pelvis without contrast (CPT® 72195) is considered medically necessary for **ANY** of the following scenarios: ◦ Cases of diagnostic uncertainty ◦ Pre-operative planning • CT Pelvis without contrast (CPT® 72192) is **NOT** routinely considered medically necessary due to lack of soft tissue contrast. ◦ It should only be performed in the rare circumstance of contrast allergy and/ or contraindication to MRI such as pacemaking device.
Meralgia Paresthetica Notes: Sensory loss in the lateral femoral cutaneous nerve as it exits the pelvis under the inguinal ligament (lateral thigh without extension into lower leg), and is usually diagnosed based on a careful history and physical exam. EMG/NCV testing is often technically difficult and not required.		
Peroneal Neuropathy	YES	• MRI Lower Extremity Joint (Knee) without contrast (CPT® 73721) **OR** MRI Lower Extremity Other Than Joint without contrast (CPT® 73718) when surgery is considered or when ordered by or in consultation with a surgeon.
Tarsal Tunnel Syndrome	N/A	• See **Soft Tissue Mass and Morton's Neuroma (MS-10.1)** in the Musculoskeletal Imaging Guidelines.

- For phrenic nerve concerns and evaluation of diaphragmatic weakness, refer to **Elevated Hemidiaphragm (CH-30)**.

Evidence Discussion (PN-2.1)

- Focal neuropathies are typically diagnosed by a combination of clinical history, thorough neurological examination, and electrodiagnostic testing with electromyography (EMG) and nerve conduction studies (NCS) (Cornely et al., 2025; Linda et al., 2010).
- When clinical evaluation and electrodiagnostic testing are inconclusive, MRI may allow for better identification and anatomic localization of lesions and is considered

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the gold standard for imaging of the peripheral nerve (Cornely et al., 2025; Kalia & Jacobson, 2019).

- Median nerve cross-sectional area measurement in the carpal tunnel with high resolution small parts ultrasound is the imaging test of choice in cases of carpal tunnel with equivocal clinical findings (Duncan, Sullivan, & Lomas, 1999)
- The sensitivity and specificity of MRI findings for carpal tunnel syndrome are low (sensitivity, 23%–96%; specificity, 39%–87%), and for this reason MRI imaging does not play a role in the routine clinical assessment of carpal tunnel syndrome (Linda et al., 2010; Hobson-Webb & Juel, 2017). However, MRI of the wrist can help identify surgical candidates when clinical and electrodiagnostic findings are inconclusive (Linda et al., 2010; Hobson-Webb & Juel, 2017).
- When caused by nerve entrapment or compression, focal neuropathies may benefit from surgical release or decompression. MRI can provide visualization of the cause of compression, rule out other causes of nerve injury, and allow for a more focused operative approach, particularly when surgery is considered to decompress common entrapment neuropathies of the ulnar, radial, and peroneal nerves (Cornely et al., 2025; Kalia & Jacobson, 2019; Hobson-Webb & Juel, 2017).
- Sciatic, femoral, and pudendal neuropathies often occur secondary to trauma, compression, or entrapment of the affected nerve. These are often diagnosed clinically or localized with electrodiagnostic testing. MRI imaging of the pelvis may be indicated to assess for sources of compression, including occult malignancy (Hobson-Webb & Juel, 2017).
- Meralgia paresthetica is the common term describing pathology of the lateral femoral cutaneous nerve of the thigh. The nerve is prone to injury and compression but may have a variable anatomic course. Meralgia paresthetica is primarily diagnosed by clinical history and exam, as neuroimaging and electrodiagnostic testing results may be difficult to interpret. Neuroimaging is most useful in cases of diagnostic uncertainty, particularly when surgical exploration and treatment are considered (Hobson-Webb & Juel, 2017).

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Polyneuropathy (PN-3)

Guideline

Polyneuropathy (PN-3.1)
References (PN-3)

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Polyneuropathy (PN-3.1)

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Criteria

Poly-Disorder	EMG/NCV Initially?	Advanced Imaging	Comments
Polyneuropathies with Central Nervous System (CNS) Involvement	YES	If clinical findings point to abnormalities in those areas, then **ANY** of the following are considered medically necessary: • MRI Brain without and with contrast (CPT® 70553), **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156), **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157), **AND/OR** • MRI Lumbar Spine without and with contrast (CPT® 72158)	Examples: inflammatory polyneuropathies unspecified, Lyme disease • For myelopathic signs and symptoms, see **Myelopathy (SP-7.1)**.

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Poly-Disorder	EMG/NCV Initially?	Advanced Imaging	Comments
AIDS-Related Cytomegaloviral Neuropathy/ Radiculopathy	YES	• MRI Lumbar Spine without and with contrast (CPT® 72158) • If concern for myelopathy, **ANY** of the following imaging are **ALSO** considered medically necessary: ◦ MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** ◦ MRI Thoracic Spine without and with contrast (CPT® 72157)	• Often presents with urinary retention and a clinically confusing picture in the legs. • For myelopathic signs and symptoms, see **Myelopathy (SP-7.1)** .
Chronic Inflammatory Demyelinating Polyneuropathy (CIDP)	YES	MRI Lumbar Spine without and with contrast (CPT® 72158) **AND/OR** MRI Cervical Spine without and with contrast (CPT® 72156) if diagnosis uncertain following EMG/NCV. • For imaging requests of the brachial or lumbosacral plexus or muscle: See **Brachial Plexus (PN-4.1)**, **Lumbar and Lumbosacral Plexus (PN-5.1)**, and **Muscle Diseases (PN-8.5)**	
Multifocal Motor Neuropathy	YES	If diagnosis is uncertain following EMG/NCV, MRI of the Brachial Plexus is considered medically necessary with **ONE** of the following: • MRI Upper Extremity Other Than Joint without and with contrast (CPT® 73220) • MRI Chest without and with contrast (CPT® 71552) • MRI Neck without and with contrast (CPT® 70543)	

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Poly-Disorder	EMG/NCV Initially?	Advanced Imaging	Comments
POEMS (Polyneuropathy, Organomegaly, Endocrinopathy, M-protein, Skin changes)	YES	Advanced imaging is for the non-neurological etiologies of this rare osteosclerotic plasmacytoma syndrome.	See **Multiple Myeloma and Plasmacytomas (ONC-25)** in the Oncology Imaging Guidelines.
Subacute Sensory Neuronopathy & Other Paraneoplastic Demyelinating Neuropathies	YES	• Advanced imaging should be guided by specific clinical concern (see relevant guideline). • For evaluation of suspected paraneoplastic syndromes, see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.	

Background and Supporting Information

- Central nervous system (CNS) imaging (brain and spinal cord) is not required for polyneuropathy without CNS signs/symptoms.
- Distal symmetric polyneuropathy is the most common pattern of generalized peripheral neuropathy. It is typically sensory predominant and may demonstrate neurological abnormalities including reduced or absent deep tendon reflexes (DTRs), reduced sensation to multiple testing modalities (vibration, proprioception, etc). In more advanced staging, mild motor weakness may be present. It is most often associated with diabetes and metabolic abnormalities. In the absence of atypical findings (such as asymmetrical presentation, significant weakness, or upper motor neuron exam findings such as hyperreflexia or spasticity), distal symmetric polyneuropathy does not require CNS imaging.

Evidence Discussion (PN-3.1)

- Polyneuropathies are typically diagnosed by a combination of clinical history, thorough neurological examination, lab work-up, and electrodiagnostic testing with electromyography (EMG) and nerve conduction studies (NCS) (Stoll, Wilder-Smith, & Bendszus, 2013).
- For systemic polyneuropathies with potential for CNS involvement, such as Lyme disease-related polyneuropathy and some inflammatory polyneuropathies, MRI imaging of the brain and/or spinal cord may be helpful to identify typical patterns of involvement or to rule out other pathologies when clinical findings suggest CNS involvement (Eftimov et al., 2020; London, 2020).

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- Neuropathy is the most common neurological complication of human immunodeficiency virus (HIV) infection and, in its most common form, is treated with symptom management and anti-viral therapy. However, other acquired immunodeficiency syndrome (AIDS)-related neurological disorders may be difficult to clinically differentiate from common HIV polyneuropathy and may require more aggressive treatment. Accurate diagnosis of AIDS-related cytomegalovirus (CMV) polyradiculopathy, HIV vasculitis, or AIDS-related motor neuron disease is required for appropriate treatment. MRI imaging of the spinal cord or nerve roots may assist with diagnosis when medically necessary (Harrison & Smith, 2011).
- Chronic acquired demyelinating polyneuropathies, including chronic inflammatory demyelinating polyneuropathy (CIDP) and multifocal motor neuropathy (MMN), are diagnosed by clinical history and results of electromyography and nerve conduction studies. If the diagnosis remains uncertain after these studies, neuroimaging may help establish the diagnosis. Evidence of lumbar nerve root involvement on MRI Lumbar Spine is supportive of a CIDP diagnosis. T2-weighted signal change on MRI of the brachial plexus is often present in MMN individuals (Stoll, Wilder-Smith, & Bendszus, 2013; Saperstein, 2008).
- Polyneuropathy, organomegaly, endocrinopathy, M-protein, skin changes (POEMS) syndrome is a disorder affecting multiple organ systems which occurs in the setting of a plasma cell disorder. Diagnosis is based on electrodiagnostic confirmation of polyneuropathy and work-up of the underlying oncologic condition (London, 2020).
- Electrodiagnostic testing can provide valuable findings in the investigation of some paraneoplastic polyneuropathies; however, identification of the underlying malignancy and appropriate oncological management are key to management (Binks et al., 2022).

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Brachial Plexus (PN-4)

Guideline

Brachial Plexus (PN-4.1)
References (PN-4)

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Brachial Plexus (PN-4.1)

PN.BP.0004.1.A
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Criteria

EMG/NCV examination is required prior to advanced imaging except in cases of malignant infiltration or radiation plexitis as detailed below.

Brachial Plexus Imaging		
Indication	**Imaging**	**Notes**
Malignant infiltration (EMG not required)	Any **ONE** of the following: • MRI Upper Extremity Other Than Joint without contrast (CPT® 73218) • MRI Upper Extremity Other Than Joint without and with contrast (CPT® 73220) • MRI Chest without contrast (CPT® 71550) • MRI Chest without and with contrast (CPT® 71552) • MRI Neck without contrast (CPT® 70540) • MRI Neck without and with contrast (CPT® 70543)	
Radiation plexitis to rule out malignant infiltration (EMG not required)		
Neurogenic thoracic outlet Syndrome (NTOS)		
Preoperative work-up requiring evaluation of the brachial plexus		
Brachial plexitis (Parsonage-Turner syndrome or painful brachial amyotrophy)	• Any **ONE** of the above studies **AND** • If there is concern for radiculopathy in addition to plexopathy, MRI Cervical Spine without contrast (CPT® 72141)	• For concern for cervical radiculopathy, see **Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma (SP-3)** • For details of brachial plexitis (Parsonage-Turner syndrome), see **Background and Supporting Information**.
Traumatic injury		

- If MRI is not available or is contraindicated, CT offers the next highest level of anatomic visualization and can characterize local osseous or vascular anatomy

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and injury. In this circumstance, when the above criteria are met, only **ONE** of the following studies is considered medically necessary:
  - **CT Neck Soft Tissue**: CT Neck without contrast (CPT® 70490), **or** CT Neck with contrast (CPT® 70491), **or** CT Neck without and with contrast (CPT® 70492)
  - **CT Upper Extremity**: CT Upper Extremity without contrast (CPT® 73200), **or** CT Upper Extremity with contrast (CPT® 73201), **or** CT Upper Extremity without and with contrast (CPT® 73202)
  - **CT Chest**: CT Chest without contrast (CPT® 71250), **or** CT Chest with contrast (CPT® 71260), **or** CT Chest without and with contrast (CPT® 71270)
- MRI should be performed prior to consideration of PET imaging.
  - For PET imaging, see **PET Imaging in Oncology (ONC-1.4)** in the Oncology Imaging Guidelines.

Background and Supporting Information
- Brachial plexitis (Parsonage-Turner syndrome or painful brachial amyotrophy) is a self-limited syndrome characterized by initial shoulder region pain followed by weakness of specific muscles in a pattern which does not conform to involvement of a single root or distal peripheral nerve.
- MRI Chest and Neck are inherently bilateral, whereas MRI Upper Extremity is unilateral.

Evidence Discussion (PN-4.1)
- MRI is the imaging study of choice to evaluate the brachial plexus due to superior soft-tissue contrast and good spatial resolution, providing detailed definition of intraneural anatomy as well as localizing pathologic lesions in conditions in which electrodiagnostic and physical findings are nonspecific (Boulter et al., 2021). A variety of findings may be seen within the brachial plexus on MRI, including increased T2 signal intensity, focal or diffuse enhancement, or enlargement or edema of nerve segments. Furthermore, signal abnormalities or atrophy in muscles supplied by the brachial plexus can help support a plexopathy. MRI is more sensitive than CT at identifying subtle infiltrative lesions regions or areas of enhancement (Rubin, 2020).
- Regarding fluorine-18-2-fluoro-2-deoxy-D-glucose (FDG)-PET/CT, there is no relevant literature to support the use of FDG-PET/CT in the evaluation of traumatic or nontraumatic brachial plexopathy in the absence of a known malignancy (Boulter et al., 2021).

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Lumbar and Lumbosacral Plexus (PN-5)

Guideline

Lumbar and Lumbosacral Plexus (PN-5.1)
References (PN-5)

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Lumbar and Lumbosacral Plexus (PN-5.1)

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Criteria

- EMG/NCV examination is required prior to advanced imaging.
  - EMG/NCV is **NOT** required if there is concern for malignant infiltration.
- For suspected lumbar and/or lumbosacral plexopathy, **ONE** of the following is considered medically necessary:
  - MRI Pelvis without contrast (CPT® 72195) with fat suppression imaging, **OR**
  - MRI Pelvis without and with contrast (CPT® 72197) with fat suppression imaging, **OR**
  - MRI Abdomen without contrast (CPT® 74181) and MRI Pelvis without contrast (CPT® 72195) with fat suppression imaging, **OR**
  - MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) with fat suppression imaging
- If suspected lumbar and/or lumbosacral plexopathy is due to a traumatic injury, then MRI Lumbar Spine without contrast (CPT® 72148) is **ALSO** considered medically necessary.
  - See **Low Back (Lumbar Spine) Trauma (SP-6.2)**
- If MRI is not available or is contraindicated, CT offers the next highest level of anatomic visualization and can characterize local osseous or vascular anatomy and injury. In this circumstance, when requested for suspected lumbar and/or lumbosacral plexopathy, **EITHER** of the following is considered medically necessary:
  - CT Pelvis with contrast (CPT® 72193) **OR**
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- For PET imaging, see **PET Imaging in Oncology (ONC-1.4)** in the Oncology Imaging Guidelines.

Background and Supporting Information

- Lumbar and lumbosacral plexopathy may be caused by any of the following:
  - Malignant infiltration
  - Radiation
  - Traumatic injury
  - Inflammation including sarcoidosis and infection

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- Toxicity, including iatrogenic during delivery (obstetric) or related to nerve blocks (e.g., Botox®)
- Metabolic, including etiologies such as diabetes

Evidence Discussion (PN-5.1)

- MRI is the imaging study of choice to evaluate the lumbosacral plexus due to superior soft-tissue contrast and good spatial resolution, providing detailed definition of intraneural anatomy as well as localizing pathologic lesions in conditions in which electrodiagnostic and physical findings are nonspecific (Boulter et al., 2021). Abnormal MRI findings in lumbosacral plexopathies include increased T2 signal intensity, focal or diffuse enhancement, or enlargement or edema of nerve segments. MRI is more sensitive than CT at identifying subtle infiltrative lesions, although CT may be useful to assess for psoas hematoma (Rubin, 2020).
- Regarding fluorine-18-2-fluoro-2-deoxy-D-glucose (FDG)-PET/CT, there is no relevant literature to support the use of FDG-PET/CT in the evaluation of traumatic or nontraumatic lumbosacral plexopathy in the absence of a known malignancy (Boulter et al., 2021).

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Muscle Disorders (PN-6)

Guideline

Muscle Disorders (PN-6)

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Muscle Disorders (PN-6)

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- See **Neuromuscular Junction Disorders (PN-8.4)**
- See **Muscle Disease (PN-8.5)**
- See **Gaucher Disease (Storage Disorders) (PN-8.6)**

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Magnetic Resonance Neurography (MRN) (PN-7)

Guideline

Magnetic Resonance Neurography (MRN) (PN-7.1)
References (PN-7)

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Magnetic Resonance Neurography (MRN) (PN-7.1)

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Criteria

- MRN is considered medically necessary when **ALL** of the following criteria are met:
  - The study is to evaluate a traumatic or compressive focal neuropathy **or** a brachial plexus injury.
  - The study is requested by a neurosurgeon, orthopedic surgeon, neurologist, or podiatrist after an in-person clinical evaluation **AND** when surgery is being considered.
  - EMG/NCV has been performed and results provided.
  - The diagnosis remains unclear following prior imaging of the region with x-ray, ultrasound, or conventional imaging (CT or MRI).
    - For conventional imaging criteria, see **Focal Neuropathy (PN-2.1)** and **Brachial Plexus (PN-4.1)**.
- MRN is reported as **ONE** of the following:
  - Unlisted MRI procedure code (CPT® 76498)

    OR
  - For focal neuropathy, MRI extremity with **ONE** of the following codes:
    - MRI Upper Extremity, Other Than Joint, without contrast (CPT® 73218)
    - MRI Upper Extremity, Other Than Joint, without and with contrast (CPT® 73220)
    - MRI Lower Extremity, Other Than Joint, without contrast (CPT® 73718)
    - MRI Lower Extremity, Other Than Joint, without and with contrast (CPT® 73720)

    OR
  - For brachial plexus injury, **ONE** of the following codes:
    - MRI Upper Extremity Other Than Joint without contrast (CPT® 73218)
    - MRI Upper Extremity Other Than Joint without and with contrast (CPT® 73220)
    - MRI Chest without contrast (CPT® 71550)
    - MRI Chest without and with contrast (CPT® 71552)
    - MRI Neck without contrast (CPT® 70540)
    - MRI Neck without and with contrast (CPT® 70543)
- MRN for **ANY** other indication is considered **NOT medically necessary** at this time, including for assessment of lumbosacral plexopathy, neuromuscular disease, and polyneuropathy.

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Background and Supporting Information

Magnetic resonance neurography (MRN) utilizes standard MRI equipment with sequences and technology that allow for optimized viewing of the peripheral nerve. MRN creates greater contrast between the nerve and other surrounding soft tissue to allow a detailed view of the nerve tissue and layers. This allows for more accurate diagnosis of the location and degree of nerve injury.

Evidence Discussion (PN-7.1)

- Magnetic resonance neurography (MRN) offers advantages over standard MRI imaging by utilizing sequences and technology that optimize viewing of the peripheral nerve. MRN presents no increased risk to safety over standard MRI (Chhabra, Madhuranthakam, & Andreisek, 2018). MRN is a non-invasive, accurate, reliable method of demonstrating normal and abnormal nerve and assessing regional muscle denervation with good surgical correlation to findings (Chhabra et al., 2016).
- Efficacy and reliability of MRN have been clinically validated in the diagnosis and localization of traumatic and compressive focal neuropathies and brachial plexus injuries for the purpose of surgical consideration (Holzgrefe et al., 2019). A clinical study assessing the impact of MRN data on surgical planning noted that review of MRN altered the suspected nerve involvement in 23% and changed the nerve injury grade in 27% of individuals studied. Surgeons reported MRN altered their determination of the need for surgery in 63%, timing of surgery in 41%, length of skin incision in 27%, and time in the operating room in 30% of cases reviewed (Chhabra et al., 2016). This data suggests that MRN may improve the selection of candidates for surgical repair of these lesions and may narrow the focus of surgery (Chhabra et al., 2016; Holzgrefe et al., 2019).
- There is insufficient literature to support the role of MRN for evaluation of other pathologies, including, but not limited to, lumbosacral plexopathy, neuromuscular disease, and polyneuropathy.

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Neuromuscular Disorders (PN-8)

Guideline

Motor Neuron Disease/Amyotrophic Lateral Sclerosis (ALS) (PN-8.1)
Spinal Muscular Atrophy (PN-8.2)
Fasciculations (PN-8.3)
Neuromuscular Junction Disorders (PN-8.4)
Muscle Diseases (PN-8.5)
Gaucher Disease (Storage Disorders) (PN-8.6)
References (PN-8)

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Motor Neuron Disease/Amyotrophic Lateral Sclerosis (ALS) (PN-8.1)

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Criteria

- A neurological examination is **NOT** required for an individual with established diagnosis of motor neuron disease/ALS **or** when diagnosis is suspected by a neurologist, geneticist, or a physical medicine and rehabilitation (PM&R) specialist.
- For initial evaluation of suspected motor neuron disease/ALS, **ANY** of the following are considered medically necessary:
  - **Brain**: MRI Brain without contrast (CPT® 70551) **or** MRI Brain without and with contrast (CPT® 70553), **AND/OR**
  - **Cervical Spine**: MRI Cervical Spine without contrast (CPT® 72141) **or** MRI Cervical Spine without and with contrast (CPT® 72156), **AND/OR**
  - **Thoracic Spine**: MRI Thoracic Spine without contrast (CPT® 72146) **or** MRI Thoracic Spine without and with contrast (CPT® 72157), **AND/OR**
  - **Lumbar Spine**: MRI Lumbar Spine without contrast (CPT® 72148) **or** MRI Lumbar Spine without and with contrast (CPT® 72158)
- Repeat imaging can be evaluated based on the appropriate **Spine Imaging Guidelines.**

Background and Supporting Information

- Evidence of lower motor neuron dysfunction in a muscle may include clinical examination of muscle weakness/wasting or EMG abnormalities to meet the criteria for the diagnosis of ALS.
- Motor neuron diseases (also known as anterior horn cell diseases) are heterogeneous and encompass either upper motor neurons, or lower motor neurons, or both. Upper motor neurons begin in the cerebral cortex and descend into the brainstem (corticobulbar), or spinal cord, where there is a connection to the lower motor neuron that exits the central nervous system and reaches out to the muscle.
  - The various types can be divided into the areas so affected:
    - Amyotrophic lateral sclerosis (Lou Gehrig's disease) – both upper and lower motor neurons
    - Primary lateral sclerosis – upper motor neurons
    - Progressive muscular atrophy – lower motor neurons
    - Progressive bulbar palsy – rare and limited to bulbar muscles, may present with dysarthria, dysphagia, weakness of jaw and facial muscles

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  - Other rare conditions:
    - Monomelic amyotrophy (Hirayama disease)
    - Spinal bulbar muscular atrophy (Kennedy disease)
- Signs of lower motor neuron pathology include weakness, fasciculations, atrophy, decreased muscle tone, decreased reflexes, and a plantar extensor response (Babinski sign).
- Signs of upper motor neuron pathology include weakness, increased muscle tone, increased reflexes, and a plantar flexor response.

Evidence Discussion (PN-8.1)

- Amyotrophic lateral sclerosis (ALS) remains primarily a clinical diagnosis; though subtle T2 hyperintensity can be seen in motor tracts on MRI in some ALS patients. There are no established imaging findings diagnostic for ALS (Izenberg, 2023)
- Nevertheless, given the devastating progression of ALS and lack of curative therapy, diagnostic work up is appropriate to look for more treatable disorders mimicking ALS (Izenberg, 2023).
- MRI of the Brain and/or Spine is indicated to evaluate for amyotrophic lateral sclerosis (ALS)-associated changes as well as evaluation for disorders that may mimic ALS (Izenberg, 2023; Agosta, Spinelli, & Filippi, 2018)).

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Spinal Muscular Atrophy (PN-8.2)

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Criteria

- Molecular genetic testing is the standard tool for diagnosis for the early consideration in any infant with weakness or hypotonia.
  - MRI is **NOT** considered medically necessary for diagnosis in children unless other diseases are being considered. See **Spinal Muscular Atrophy (PEDPN-5.1)**.
- In individuals with adult-onset disease, the differential includes later-onset motor neuron disorders, such as ALS.
  - For these conditions, advanced imaging is considered medically necessary when upper and lower motor neuron findings are present. For imaging, see **Motor Neuron Disease/Amyotrophic Lateral Sclerosis (ALS) (PN-8.1)**.

Evidence Discussion (PN-8.2)

- Spinal muscular atrophy (SMA) is a genetic/hereditary disorder. Molecular genetic testing is the standard tool for diagnosis of SMA (Prior, Leach, & Finanger, 2000; Oskoui & Servais, 2023).

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Fasciculations (PN-8.3)

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Criteria

Fasciculations are involuntary, irregular movements of muscle caused by activation of a single motor unit that may be secondary to benign or non-benign etiologies.

- **ALL** of the following evaluations are required prior to advanced imaging:
  - **History and physical exam** should include documentation of the following: time course of symptoms, areas of involvement, weakness, and any associated symptoms such as pain, sensory loss, or bowel or bladder dysfunction.
  - **EMG/NCV evaluation**
  - **Laboratory evaluation** (e.g., complete blood count; comprehensive metabolic panel; serum calcium; thyroid function testing; vitamin B12 level; sed rate; ANA; rheumatoid factor; serum protein electrophoresis with immunofixation; Lyme testing; HIV testing; testing for heavy metals; etc.)

  In the setting of clinical concern for radiculopathy, neuromuscular disorders, or muscle disorders, see the following imaging guidelines:
  - **Neuromuscular Junction Disorders (PN-8.4)**
  - **Muscle Diseases (PN-8.5)**
  - **Neck (Cervical Spine) Pain without and with Neurological Features (Including Stenosis) (SP-3.1)**
  - **Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) with or without Low Back (Lumbar Spine) Pain (SP-6.1)**
- In the presence of upper motor neuron signs (e.g., increased tone; hyperreflexia; presence of Babinski or Hoffman signs) when there is concern for motor neuron disease, including amyotrophic lateral sclerosis (ALS), **ANY** of the following CNS studies are considered medically necessary:
  - **Brain**: MRI Brain without contrast (CPT® 70551) **or** MRI Brain without and with contrast (CPT® 70553), **AND/OR**
  - **Cervical Spine**: MRI Cervical Spine without contrast (CPT® 72141) **or** MRI Cervical Spine without and with contrast (CPT® 72156), **AND/OR**
  - **Thoracic Spine**: MRI Thoracic Spine without contrast (CPT® 72146) **or** MRI Thoracic Spine without and with contrast (CPT® 72157)
  - See **Motor Neuron Disease/Amyotrophic Lateral Sclerosis (ALS) (PN-8.1)**
- **Lumbar Spine**: Lumbar spine imaging is considered **NOT** medically necessary unless there is sphincter involvement **or** there is a need to rule out lower motor

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neuron etiologies in the lower extremities (e.g., lumbar radiculopathy). See the following Spine Imaging Guidelines:

- **Red Flag Indications (SP-1.2)**
- **Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) with or without Low Back (Lumbar Spine) Pain (SP-6.1)**

Evidence Discussion (PN-8.3)

- Fasciculations in isolation are usually benign, especially when they occur repetitively for seconds at a single site and in a single muscle. Fasciculations are more likely to be pathologic if they occur simultaneously in multiple muscles or if they are associated with objective weakness, atrophy, or hyperreflexia (Filippakis et al., 2018).
- Although fasciculations are characteristic of motor neuron disease/amyotrophic lateral sclerosis (MND/ALS) and may occur in other neurological conditions, they are also a very common occurrence in the general population, being noticed by about 80% of normal healthy individuals (Bashford et al., 2021).
- EMG/NCV evaluation may help differentiate individuals with benign fasciculations from those who warrant further investigation (Filippakis et al., 2018; Bashford et al., 2021).
- Appropriate laboratory evaluation and imaging would depend on the suspected etiology (Filippakis et al., 2018; Bashford et al., 2021).

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Neuromuscular Junction Disorders (PN-8.4)

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Criteria

Myasthenia Gravis (MG)

- For imaging requests related to ptosis and ocular movements associated with MG, see **Eye Disorders and Visual Loss (HD-32.1)**
- After an established diagnosis of MG or when MG is suspected by a neurologist, rheumatologist, or ophthalmologist, ONE of the following is considered medically necessary to assess for MG-related thymic disease:
  - CT Chest with contrast (CPT® 71260), **OR**
  - CT Chest without contrast (CPT® 71250), **OR**
  - MRI Chest without and with contrast (CPT® 71552), **OR**
  - MRI Chest without contrast (CPT® 71550)
- Repeat of **ANY ONE** of the above imaging studies is considered medically necessary if the initial imaging study was negative for **ANY** of the following scenarios:
  - Symptoms of chest mass
  - Rising anti-striated muscle antibody titers
  - Need for pre-operative evaluation (clinical presentation, electro-diagnostic studies, and antibody titers)

Lambert–Eaton Myasthenic Syndrome (LEMS)

Lambert–Eaton myasthenic syndrome (LEMS) is associated with malignancies, especially small cell lung cancer.

- For a suspected diagnosis, **ANY** of the following are considered medically necessary: CT Chest with contrast (CPT® 71260) **AND/OR** CT Abdomen and Pelvis with contrast (CPT® 74177)
  - See **Paraneoplastic Syndromes (ONC-30.3)**
- If initial CT was negative and there is persistent suspicion, **ANY** of the above imaging studies are considered medically necessary every 6 months for 2 years from date of initial negative imaging.
  - See **Paraneoplastic Syndromes (ONC-30.3)**

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Stiff-Person Syndrome

Stiff-person syndrome is associated with cancers such as, but not limited to, small cell lung cancer, pancreatic neuroendocrine cancer, and breast cancer.

- If stiff-person syndrome is suspected based on clinical findings, **ANY** of the following are considered medically necessary:
  - **Abdomen/Pelvis**: CT Abdomen and Pelvis with contrast (CPT® 74177), **or** CT Abdomen and Pelvis without and with contrast (CPT® 74178), **OR** MRI Abdomen without and with contrast (CPT® 74183), **and** MRI Pelvis without and with contrast (CPT® 72197)
  - **Chest**: CT Chest with contrast (CPT® 71260), **or** CT Chest without contrast (CPT® 71250)
  - **Symptomatic Body Areas**: CT with contrast **or** MRI without and with contrast of any other symptomatic body areas
  - See **Paraneoplastic Syndromes (ONC-30.3)**

Background and Supporting Information

- Myasthenia gravis is an autoimmune disease of the neuromuscular junctions, manifested by fatigable weakness of the cranial nerves (examples - ocular: ptosis, diplopia; bulbar: dysphagia, dysarthria, dysphonia), as well as generalized limb weakness, depending on the severity of the disease. Associated antibodies: acetylcholine receptor (AChR), muscle specific kinase (MuSK).
- Lambert Eaton myasthenic syndrome (LEMS) is also an autoimmune disease affecting the neuromuscular junction presenting with ocular and bulbar symptoms and proximal limb weakness. Associated antibodies: P/Q voltage-gated calcium channel (VGCC).
- LEMS can occur as a paraneoplastic syndrome associated with malignancy (cancer-associated LEMS) or as an autoimmune phenomenon in the absence of malignancy (non-tumor LEMS). Between 50% and 60% of all LEMS cases are associated with malignancy, particularly small cell lung carcinoma (SCLC), although LEMS has been described in individuals with non–small cell and mixed-cell lung carcinomas, neuroendocrine tumors such as prostate cancer, thymoma, and lymphoproliferative disorders.
- Stiff-person syndrome is an autoimmune disease associated with muscle spasm and muscle rigidity affecting the trunk and limb muscles. Associated antibodies: Glutamic acid decarboxylase (GAD).

Evidence Discussion (PN-8.4)

- In individuals with myasthenia gravis, advanced chest imaging with CT or MRI is preferred over x-ray for the evaluation of thymic disease and for planned thymectomy (Hehir, 2022; Tuan et al., 2019).

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- Lambert-Eaton myasthenic syndrome has been associated with malignancies (Raja, 2022; Kesner et al., 2018). Initial and repeat imaging with CT of Chest and/or Abdomen and Pelvis are supported to evaluate for associated cancers, especially small cell lung cancer and neuroendocrine tumors (Lancaster, 2017).
- Stiff-person syndrome has been associated with malignancies (Newsome & Johnson, 2022; Dade et al., 2020). Initial and repeat imaging of the chest and/or abdomen and/or pelvis and/or any symptomatic body area with CT Chest and/or CT Abdomen and Pelvis or MRI Abdomen and/or Pelvis and/or CT or MRI of any symptomatic body area are supported to evaluate for associated cancers, such as small cell lung cancer, pancreatic neuroendocrine cancer, and breast cancer (Lancaster, 2017).

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Muscle Diseases (PN-8.5)

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Criteria

Imaging for Muscle Disease		
Disease	**Indication**	**Imaging**
Any Known or Suspected Muscle Disease	To plan muscle biopsy	Typically an affected muscle is imaged. ◦ Upper Extremity: MRI Upper Extremity Other Than Joint without contrast (CPT® 73218) **OR** MRI Upper Extremity Other Than Joint without and with contrast (CPT® 73220)* **AND/OR** ◦ Lower Extremity: MRI Lower Extremity Other Than Joint without contrast (CPT® 73718) **OR** MRI Lower Extremity Other Than Joint without and with contrast (CPT® 73720)* * When indication column criteria are met, bilateral studies are supported if requested.
Myopathy or Myositis	Additional evaluation after clinical exam, EMG/NCV, **OR** labs	
Inflammatory Muscle Diseases ◦ Dermatomyositis ◦ Polymyositis ◦ Inclusion body myositis	◦ Evaluation of differential diagnosis ◦ Selection of biopsy site ◦ Clinical concern for progression ◦ Treatment monitoring ◦ Detection of occult malignancy	

- For interstitial lung disease associated with inflammatory myopathies, see **Interstitial Lung Disease (ILD)/Diffuse Lung Disease (DLD) (CH-11.1)** in the Chest Imaging Guidelines.
- For dermatomyositis and polymyositis with concern for occult neoplasm, see **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.

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Evidence Discussion (PN-8.5)

- MRI is supported in known or suspected muscle disease to identify involved muscle(s). MRI may highlight muscle edema and pathology at the potential biopsy site (Filippi et al., 2010). MRI is helpful to avoid a false-negative biopsy (Albayda, Demonceau, & Carlier, 2022).
- MRI may be helpful in demonstrating abnormalities in muscles that are difficult to examine or not clinically weak and can help distinguish between different types of muscle disease. MRI is also useful in determining sites for muscle biopsy.
- The ordering of tests should be based on the differential diagnosis arrived at by history and examination. Laboratory evaluation is often a critical initial step to guide further investigations. Nerve conduction studies and EMG aid in making the diagnosis of neuromuscular disorders and are best conceptualized as extensions of the history and neurologic examination.
- MRI of the affected muscle is supported in the evaluation of individuals with suspected inflammatory myopathy to help identify a reversible etiology such as immune-mediated necrotizing myopathy.
- MRI of affected muscle is supported in the diagnosis and follow-up of individuals with inflammatory myopathies, such as dermatomyositis, polymyositis and inclusion body myositis to identify disease-specific patterns and evaluate response to treatment.
- Inflammatory muscle diseases, including dermatomyositis and polymyositis, have been associated with malignancy. Initial and repeat imaging with CT Chest and/or Abdomen and Pelvis are supported to evaluate for associated cancers, such as adenocarcinomas (Tudorancea et al., 2021).

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Gaucher Disease (Storage Disorders) (PN-8.6)

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Criteria

Imaging for Gaucher Disease
Initial Imaging: Any or all of the following:
• MRI Lumbar Spine without contrast (CPT® 72148) • Bilateral Femurs with MRI Lower Extremity, Other Than Joint, without contrast (CPT® 73718) • MRI Abdomen without contrast (CPT® 74181) • CT Chest without contrast (CPT® 71250) for individuals with new or worsening pulmonary symptoms
Every 12 months: Any or all of the following:
• To assess treatment response for individuals on enzyme replacement therapy or assess disease progression for individuals in surveillance ◦ MRI Lumbar Spine without contrast (CPT® 72148) ◦ Bilateral Femurs with MRI Lower Extremity, Other Than Joint, without contrast (CPT® 73718) ◦ MRI Abdomen without contrast (CPT® 74181) ◦ CT Chest without contrast (CPT® 71250) for individuals with documented pulmonary involvement
New or worsening pulmonary symptoms
• CT Chest without contrast (CPT® 71250)
Acute bone pain
• An initial x-ray should be obtained ◦ MRI of affected areas with and without contrast if x-ray is non-diagnostic or indicates the need for further imaging, such as equivocal for osteonecrosis, infection, or malignancy

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- PET/CT imaging is considered not medically necessary in the evaluation of Gaucher disease.

Background and Supporting Information

- Gaucher disease is a group of autosomal recessive inborn errors of metabolism characterized by lack of the enzyme acid ß-glucuronidase with destructive ceramide storage in various tissues. Gaucher disease is a treatable disorder (enzyme replacement) in which the liver, spleen, and bone marrow/bones are the most affected organs. Diagnosis is established by decreased enzyme activity or genetic testing.
- Three major types of Gaucher disease are recognized:
  - **Type I** (non-neuropathic form or adult form): progressive hepatomegaly, splenomegaly, anemia and thrombocytopenia, and marked skeletal involvement; lungs and kidneys may also be involved, but central nervous system is spared
  - **Type II** (acute neuropathic form or infantile form): severe progressive neurological involvement and death by 2 to 4 years of age; hepatomegaly and splenomegaly are also present (usually evident by 6 months of age)
  - **Type III**: type I with neurological involvement and slowly progressive disease. Onset may be present before 2 years of age with survival to the third or fourth decade of life.
- Additionally, there is a perinatal-lethal and a cardiovascular form. The cardiovascular form involves the heart, spleen and eyes. Note that cardiopulmonary complications may be present, with varying frequency and severity, in all subtypes.
- Individuals with Gaucher disease are at risk for osteonecrosis, osteomyelitis, and bony tumors.

Evidence Discussion (PN-8.6)

- Initial imaging and lifelong re-imaging is supported due to Gaucher disease's progressive, multisystem involvement (Hughes & Pastores, 2000; Degnan et al., 2019; Simpson, Hermann, & Balwani, 2014).
- Due to bone involvement, including increased risk for multiple myeloma, skeletal x-rays, MRI of Lumbar Spine and MRI Bilateral Femurs are supported (Hughes & Pastores, 2000; Degnan et al., 2019; Simpson, Hermann, & Balwani, 2014). Delineating the extent of disease can have a positive impact on developing appropriate treatment strategies.
- CT is the preferred study for the evaluation of lung parenchyma and is supported to evaluate for pulmonary involvement (Hughes & Pastores, 2000; Degnan et al., 2019; Simpson, Hermann, & Balwani, 2014).
- MRI Abdomen is supported to evaluate for associated visceral disease, such as hepatic, splenic and biliary disease (Hughes & Pastores, 2000; Degnan et al., 2019; Simpson, Hermann, & Balwani, 2014). This modality has better signal-to noise-ratio and soft tissue contrast helping to make more precise diagnosis.

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- The role of PET/CT imaging in Gaucher disease is yet to be established. Unnecessary use of this study would expose the individual to excess radiation and noncontributory imaging.
- F-FDG does not reliably detect Gaucher disease in the marrow, and other isotopes are not yet FDA-approved for clinical use.

PNND Imaging Guidelines

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Peripheral Nerve Sheath Tumors (PNST) (PN-9)

Guideline

Peripheral Nerve Sheath Tumors (PNST) (PN-9.1)
References (PN-9)

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Peripheral Nerve Sheath Tumors (PNST) (PN-9.1)

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Criteria

PNST such as Schwannomas or neurofibromas arise from Schwann cells or other connective tissue of the nerve. They can be located anywhere in the body.

When Peripheral Nerve Sheath Tumors (PNST) is suspected, the following advanced imaging is considered medically necessary:	
Suspected Lesion/Indication	**Imaging**
Vestibular Schwannoma	• MRI Brain without and with contrast (CPT® 70553) See **Acoustic Neuroma and Other Cerebellopontine Angle Tumors (HD-33.1)** in the Head Imaging Guidelines
Paraspinal Neurofibroma	**ANY** of the following imaging: • MRI Cervical Spine without and with contrast (CPT® 72156), **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157), **AND/OR** • MRI Lumbar Spine without and with contrast (CPT® 72158)

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When Peripheral Nerve Sheath Tumors (PNST) is suspected, the following advanced imaging is considered medically necessary:	
Neurofibroma of the Limb or Torso (other than Paraspinal)	• MRI without and with contrast or without contrast of the area of interest after plain x-ray* ◦ See **Soft Tissue Mass (MS-10.1)** in the Musculoskeletal Imaging Guidelines *Plain x-ray is not required in an individual with a cancer predisposition syndrome. • See **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)** in the Pediatric and Special Populations Oncology Imaging Guidelines

Routine follow-up imaging is NOT considered medically necessary *except in the following scenarios:*	
Suspected Lesion/Indication	**Imaging**
New symptoms or neurological findings	• MRI without and with contrast of the known body area containing PNST
Post-operatively for ANY of the following scenarios: • At the discretion of or in consultation with the surgeon; • If the tumor was not completely removed and the imaging is requested to re-establish baseline	• MRI without and with contrast of the known body area containing PNST or from which PNST was removed
Request for metastatic work-up when malignant transformation is known or suspected	**ANY** of the following imaging: • CT Chest with contrast (CPT® 71260) **AND/OR** • CT Abdomen with contrast (CPT® 74160)

- For guidelines related to known malignancies in individuals with neurofibromatosis 1 (NF1), see the appropriate imaging guideline for the specific cancer type.

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Evidence Discussion (PN-9.1)

- Peripheral nerve sheath tumors (PNSTs) may arise from any body region. PNSTs are susceptible to malignant transformation. Therefore, MRI of the known or suspected body region is supported for evaluation.
- MRI is the preferred imaging modality for soft tissue tumors, such as PNSTs, and is a relatively safe imaging modality since radiation exposure is not involved. The role of PET imaging in peripheral nerve sheath tumors is not yet well established (Assadi et al., 2019). Otherwise, PET imaging in this clinical scenario would not add any clinical value and would unnecessarily expose individuals to radiation.
- For investigation of non-paraspinal lesions, x-ray of the region of concern is appropriate for the initial evaluation of both superficial and deep soft tissue masses (Garner et al. 2023).
- After initial x-rays, MRI of the affected region can help exclude other diagnoses, define tumor size and association with adjacent structures, and provide information relevant to presurgical planning for non-paraspinal Neurofibromas (Soldatos et al., 2015).
- The role of PET imaging in peripheral nerve sheath tumors is not yet well established (Assadi et al., 2019).
- Malignant transformation may be present in approximately 5% of peripheral nerve sheath tumors.

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Nuclear Imaging (PN-10)

Guideline

Nuclear Imaging (PN-10.1)
References (PN-10)

PNND Imaging Guidelines

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Nuclear Imaging (PN-10.1)

PN.NI.0010.1.A
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Criteria

Nuclear medicine studies are considered **NOT** medically necessary in the evaluation of peripheral nerve disorders.

Evidence Discussion (PN-10)

- Though PET has well established roles in disorders other than peripheral neuropathies, the resolution of PET limits its usefulness in evaluation of peripheral nerve disorders (Luzhansky et al., 2019). As a result, PET may be most useful for nerve injury in combination with higher resolution structural imaging such as MRI (Tan, Jeyaratnam, & Lim, 2023).
- Fusion PET/MRI's role in peripheral nerve injuries is less defined and still largely limited to animal studies as an alternative non-invasive diagnostic modality (Tan, Jeyaratnam, & Lim, 2023).

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Procedure Codes Associated with Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging

Guideline

Procedure Codes Associated with Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging

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Procedure Codes Associated with Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging

PNP.GG.ProcedureCodes.A
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MRI	CPT®
MRI Neck without contrast	70540
MRI Neck without and with contrast	70543
MRI Cervical without contrast	72141
MRI Cervical without and with contrast	72156
MRI Brachial Plexus without contrast (unilateral)	73218
MRI Brachial Plexus without and with contrast (unilateral)	73220
MRI Brachial Plexus without contrast (bilateral)	71550
MRI Brachial Plexus without and with contrast (bilateral)	71552
MRI Chest without contrast	71550
MRI Chest without and with contrast	71552
MRI Thoracic without contrast	72146
MRI Thoracic without and with contrast	72157
MRI Lumbar without contrast	72148
MRI Lumbar without and with contrast	72158
MRI Abdomen without contrast	74181

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MRI	CPT®
MRI Abdomen without and with contrast	74183
MRI Pelvis without contrast	72195
MRI Pelvis without and with contrast	72197
MRI Upper Extremity Other Than Joint without contrast	73218
MRI Upper Extremity Other Than Joint with contrast	73219
MRI Upper Extremity Other Than Joint without and with contrast	73220
MRI Upper Extremity Joint without contrast	73221
MRI Upper Extremity Joint with contrast	73222
MRI Upper Extremity Joint without and with contrast	73223
MRI Lower Extremity Other Than Joint without contrast	73718
MRI Lower Extremity Other Than Joint with contrast	73719
MRI Lower Extremity Other Than Joint without and with contrast	73720
MRI Lower Extremity Joint without contrast	73721
MRI Lower Extremity Joint with contrast	73722
MRI Lower Extremity Joint without and with contrast	73723
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Upper Extremity	73225
MRA Lower Extremity	73725

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Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Bone Marrow Imaging Limited Areas	78102
Bone Marrow Imaging Multiple Areas	78103
Bone Marrow Imaging Whole Body	78104
Nuclear Bone Scan Limited	78300
Nuclear Bone Scan Multiple Areas	78305
Nuclear Bone Scan Whole Body	78306
Bone Scan Three Phase	78315
Radiopharmaceutical Localization Imaging Limited Area	78800
Radiopharmaceutical Localization Imaging Whole Body	78802
Radiopharmaceutical Localization Imaging SPECT	78803

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Abbreviations and Glossary for the PVD Imaging Guidelines

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(See also: Cardiac Imaging Guidelines Glossary)

AAA	Abdominal aortic aneurysm
ABI	Ankle brachial index: a noninvasive, non-imaging test for arterial insufficiency – (see toe-brachial index below). This testing can also be done after exercise if resting results are normal.
Claudication or intermittent claudication	usually a painful cramping sensation of the legs with walking or severe leg fatigue
CLI	Critical Limb Ischemia
CTA	Computed tomography angiography
CTV	Computed tomography venography
DLCO	Diffusion capacity: defined as the volume of carbon monoxide transferred into the blood per minute per mmHg of carbon monoxide partial pressure
DVT	Deep venous thrombosis
ECG	Electrocardiogram
ENT	Ears, Nose, Throat
EVAR	Endovascular Aneurysm Repair
HbA1C	Hemoglobin A1C: test used to determine blood sugar control for individuals with diabetes
MRA	Magnetic resonance angiography

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MRV	Magnetic resonance venography
PAD	Peripheral artery disease
PAH	Pulmonary artery hypertension
PFT	Pulmonary function tests
PVD	Peripheral vascular disease
PSV ratio	Peak systolic velocities
SVC	Superior vena cava
TEVAR	Thoracic Endovascular Aortic Repair
TIA	Transient ischemic attack
TTE	Transthoracic echocardiogram
Toe-Brachial Index	Useful in individuals with ABI above the normal range due to non-compressible posterior tibial or dorsalis pedis arteries
V/Q Scan	Ventilation and perfusion scan

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General Guidelines (PVD-1.0)

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General Guidelines

Criteria

- Prior to considering advanced imaging, a pertinent clinical evaluation or meaningful technological contact performed since the symptoms began or worsened is required describing any relevant medical treatments and a vascular history and physical that includes (when applicable):
  - Palpation of pulses
  - Evaluation of lower extremities for presence of non-healing wounds or gangrene
  - Associated skin changes such as thickened nails, absence of hair in the feet or calves, cool extremities
  - Evaluation for the presence of arterial bruits
  - Appropriate laboratory studies
  - Non-advanced imaging modalities, such as recent ABIs, venous duplex or venous valvular insufficiency study (VVI) performed after symptoms started or worsened
  - The affected limb(s), the extent of the edema (calf and/or thigh), pitting or non-pitting. With regard to venous insufficiency, presence or absence of hyperpigmentation or other skin changes, ulcerations if applicable, size of varicosities if present as well as distribution
  - Arterial examination to rule out phlegmasia alba/cerulea dolens which is compromised arterial flow secondary to extensive DVT if applicable
  - Appropriate laboratory studies, for example d-dimer, if applicable
- Arterial- ABI should be measured first:
  - If normal, then further vascular studies are generally considered not medically necessary.
  - If clinical suspicion for PAD remains high with normal ABI's, exercise ABI's (CPT® 93924) can be performed on a treadmill to elicit ischemia.
  - The TBI (toe-brachial index) is used to establish the diagnosis of PAD in the setting of non-compressible arteries (ABI ≥1.40) and may also be used to assess perfusion in individuals with suspected CLI (rest pain and/or non-healing wound).
- If a prior imaging study (Ultrasound, MRA, CTA, Catheter angiogram, etc.) has been completed for a condition, a follow-up, additional, or repeat study for the same condition is generally considered not medically necessary unless there has been

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a change in the individual's condition, previous imaging showed an indeterminate finding, or condition-specific sections in these guidelines support routine follow-up imaging.

- Runoff studies (CPT® 75635 for CTA or CPT® 74185, CPT® 73725, and CPT® 73725 for MRA) image from the umbilicus to the feet.
  - CTA Abdomen and lower extremities should be reported as CPT® 75635, rather than using the individual CPT® codes for the abdomen, pelvis, and legs.
  - MRA Abdomen, MRA Pelvis, and MRA Lower extremities should be reported as CPT® 74185, CPT® 73725, and CPT® 73725. The CPT® code for MRA Pelvis (CPT® 72198) should not be included in this circumstance.
- CTA Head and Neck should be reported as CPT® 70471, rather than using the individual codes for the CTA Head and CTA Neck.
- Venous-imaging
  - Venous duplex (CPT® 93970, CPT® 93971) of the limb is the initial imaging of choice.
  - Follow-up duplex imaging is considered not medically necessary to document resolution and should only be obtained for new signs/symptoms or for concerns of propagation of thrombus when the treatment plan would change (insertion of IVC filter, change of anticoagulation, etc.).

Evidence Discussion

Venous duplex should visualize the veins, with demonstration of the presence or absence of compressibility and venous flow. Venous valvular insufficiency studies visualize the veins of the lower extremity, assess for reflux (reversal of venous antegrade flow after valve closure) and measure its duration. CTV or MRV Abdomen and Pelvis images with contrast involves taking images from the diaphragm to just below the inguinal ligament after a delay of a few minutes after IV contrast is administered to optimize filling and therefore visualization of the venous vasculature.

Venous disease can be classified into three categories:

- Veno-occlusive disease
  - Types of thrombotic disease
    - Superficial venous thrombosis
    - Deep venous thrombosis
    - Iliac vein obstruction, unilateral or bilateral
    - May-Thurner syndrome
  - Signs/Symptoms of veno-occlusive disease is generally sudden onset of pain and edema in the limb.
  - Risk factors include age >40, obesity, pregnancy, prolonged immobility, post-surgery, and malignancy among others.

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- Procedures related to veno-occlusive disease include:
  - Thrombolysis
  - Thrombectomy
  - Post-iliac vein stent/angioplasty

- Venous insufficiency
  - Types of venous insufficiency:
    - Superficial and deep venous reflux
    - Varicose veins
    - Reticular and spider veins.
  - Signs/symptoms of venous insufficiency include:
    - Chronic swelling in the leg that is relieved with elevation
    - Chronic swelling in the leg that is worse in the evenings
    - Aching or sense of heaviness in the leg
    - Hyperpigmentation of the calf particularly around the ankle
    - Itchy skin on legs and feet
    - Leather appearance of the skin of the calves
    - Skin ulcers in the calf particularly around the medial malleolus
    - Varicose veins
    - Spider veins/reticular veins/telangiectasias
  - Procedures related to the venous insufficiency include:
    - Endovenous laser ablation utilizing either chemical, laser or radio-frequency
    - Saphenous vein high ligation and stripping
    - Phlebectomy, stab or powered
    - Sclerotherapy, liquid or foam
- Venous malformations
  - Types of venous malformations include:
    - Arterio-venous malformations which can occur throughout the body
    - See **Pulmonary AVM (CH-24)** in the Chest imaging guidelines
    - See **Aneurysm and AVM (HD-12)** in the Head imaging guidelines
    - See **Pelvic Pain/Dyspareunia (PV-11)** in the Pelvic imaging guidelines
    - Klippel-Trenaunay which affects primarily the lower extremity venous circulation and is characterized by varicose veins, limb size discrepancies, and port-wine stains.
  - Treatment includes:
    - Primarily embolization
    - Sclerotherapy
      - Klippel-Trenaunay: treatment can include phlebectomy and sclerotherapy of symptomatic varicose veins provided they meet the criteria for intervention.

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General Information

- Risk factors for vascular disease include:
  - Diabetes
  - Cigarette smoking
  - Hypertension
  - Hyperlipidemia
  - Age >50, with at least one risk factor, are considered “at risk” for vascular disease
  - See also: **Impotence/Erectile Dysfunction (PV-17)** in the Pelvis Imaging Guidelines.
- Signs and symptoms of peripheral arterial disease
  - Claudication (cramping pain in the legs, most notably back of the calves but can involve hips or thighs, after walking which is relieved with rest but recurs at a predictable distance)
    - Symptoms that are not consistent with claudication include
      - Generalized leg pain
      - Nocturnal cramps
      - Pain that is not easily relieved after a few minutes of rest
      - Burning pain in feet
  - Critical limb ischemia
    - Rest pain: Pain in the foot (not leg) at rest, particularly at night when the leg is elevated. Pain is relieved by dangling the leg off the bed or moving to an upright position.
    - Non-healing wounds: Wounds present for >2 weeks with little to no evidence of healing
  - Erectile dysfunction can be associated with vascular disease.
- Claudication and critical limb ischemia have different natural histories. Claudication generally follows a benign indolent course. 70% of individuals with claudication will have the same symptoms after five years with no progression. Critical limb ischemia, on the other hand, is associated with a high rate of limb loss (25%) and death (35%) one year after presentation
- Simultaneous venous and arterial systems evaluation are unusual but are occasionally needed.
- Post-angioplasty/reconstruction: follow-up imaging is principally guided by symptoms. See also:
  - **Post Aortic Endovascular/Open Surgery Surveillance Studies (PVD-6.8)**
  - **Post-procedure Surveillance Studies (PVD-7.3)**

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General Guidelines – Imaging

- Imaging Studies:
  - Carotid studies MRA Neck CPT® 70543) or CTA Neck (CPT® 70498) capture the area from the top of the aortic arch (includes the origin of the innominate artery, common carotid artery, and subclavian artery, which gives off the vertebral artery) to the base of the skull.
  - CTA or MRA Abdomen (CPT® 74175 or CPT® 74185) images from the diaphragm to the umbilicus or iliac crest.
  - CTA or MRA Chest (CPT® 71275 or CPT® 71555) images from the base of the neck to the dome of the liver.
  - Runoff studies (CPT® 75635 for CTA or CPT® 74185, CPT® 73725, and CPT® 73725 for MRA) image from the umbilicus to the feet.
    - CTA Abdomen and lower extremities should be reported as CPT® 75635, rather than using the individual CPT® codes for the abdomen, pelvis, and legs.
    - MRA Abdomen, MRA Pelvis and MRA Lower extremities should be reported as CPT® 74185, CPT® 73725, and CPT® 73725. The CPT® code for MRA Pelvis (CPT® 72198) should not be included in this circumstance.

Quantification of plaque morphology

CPT® 0710T, CPT® 0711T, CPT® 0712T, CPT® 0713T

There is insufficient evidence to support the routine use of data from non-coronary computed tomography angiography (CTA) to quantify plaque morphology in noncoronary vessels. These studies are considered experimental, investigational, or unproven (Guo et al., 2025).

Procedure Coding

Code	Description
0711T	Noninvasive arterial plaque analysis using software processing of data from non-coronary computerized tomography angiography; data preparation and transmission

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Code	Description
0712T	Noninvasive arterial plaque analysis using software processing of data from non-coronary computerized tomography angiography; quantification of the structure and composition of the vessel wall and assessment for lipid-rich necrotic core plaque to assess atherosclerotic plaque stability
0713T	Noninvasive arterial plaque analysis using software processing of data from non-coronary computerized tomography angiography; data review, interpretation and report

Paragraph

CPT®	Description
93888	Transcranial Doppler study of the intracranial arteries; limited study
93893	Transcranial Doppler study of the intracranial arteries; emboli detection with intravenous microbubble injection

CPT®	Description
93985	Duplex scan of arterial inflow and venous outflow for preoperative vessel assessment prior to creation of hemodialysis access; complete bilateral study
93986	Duplex scan of arterial inflow and venous outflow for preoperative vessel assessment prior to creation of hemodialysis access; complete unilateral study

Nuclear Medicine Imaging Indications

Criteria

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- Nuclear medicine studies are rarely used in the evaluation of peripheral vascular disorders but are considered medically necessary in the following circumstances:
  - Lymphoscintigraphy (CPT® 78195) for evaluation of lower extremity lymphedema when recent Doppler ultrasound of the lower extremity and abdomen are negative for valvular insufficiency
  - Indium 111 (^{111}In)–labeled white blood cell (WBC) or Gallium-67 citrate studies (CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803) for evaluation of **any** of the following:
    - Mycotic aneurysms
    - Vascular graft infection
    - Infection of central venous catheter or other indwelling device
  - PET/CT (CPT® 78815) for clinical suspicion of aortic infection (graft or native aorta) when **both** of the following apply:
    - CT-angiogram is equivocal/indeterminate AND
    - Indium-111 or Gallium-67 studies have not been performed **and** are not available or not technically feasible.

Non-indications

Evidence does not support routine use of these studies for peripheral vascular evaluation. MRA, CTA, and duplex ultrasonography provide superior diagnostic value more likely to impact clinical management. Therefore, these studies are considered not medically necessary for any peripheral vascular imaging indication:

- Venous thrombosis imaging (CPT® 78456, CPT® 78457, and CPT® 75458)
- Vascular flow imaging (CPT® 78445)

Codes for Nuclear Medicine Imaging

CPT	Description
78195	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization; limited area (e.g., skull base to mid-thigh)
78800	Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s); limited area (e.g., single area imaging).
78801	Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s); multiple areas.
78802	Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s); whole body

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CPT	Description
78803	Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s); tomographic (SPECT).
78815	Positron emission tomography (PET), with concurrently acquired computed tomography (CT) for attenuation correction and anatomic localization imaging; limited area (e.g., skull base to mid-thigh).
78456	Acute venous thrombosis imaging, pulmonary (includes ventilation and perfusion imaging when performed).
78457	Acute venous thrombosis imaging, pulmonary; nonimaging (e.g., probe-based), includes data acquisition, interpretation, and report.
78458	Acute venous thrombosis imaging, pulmonary; quantitative.
78445	Thyroid imaging with uptake; single determination.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Genetic Predisposition to Arterial Disease

Guideline

Screening for Peripheral Artery /Aneurysmal Disease (PVD-2)
References

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Screening for Peripheral Artery / Aneurysmal Disease (PVD-2)

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Asymptomatic Screening (PVD-2.1)

Criteria

- Routine screening of asymptomatic individuals for PAD is considered not medically necessary. Those with CVD risk factors should be placed on best medical management and should be questioned on symptoms of PAD at annual physicals.
- Currently, there is no evidence to demonstrate that screening all individuals with PAD for asymptomatic atherosclerosis in other arterial beds improves clinical outcome.
- Resting ABI's may be considered medically necessary in individuals with abnormal pulse exams.
- Screening in the presence of aortic aneurysms:
  - In an individual with a known TAA, screening for AAA is considered medically necessary with an abdominal duplex. See **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)**.
  - In an individual with a known AAA, screening for TAA is not supported by sufficient evidence and is considered not medically necessary.

Evidence Discussion

Screening for Suspected Peripheral Artery Disease/Aneurysmal Disease

Generally, routine screening for peripheral arterial disease in asymptomatic patients is not cost-effective and has not been shown to improve patient outcomes. There are some familial and genetic conditions that may predispose individuals to aneurysmal disease and dissection. In these cases, surveillance imaging has been shown to improve early detection and intervention when indicated. Conditions that may have an elevated risk for vascular disease include:

- Familial Aneurysm Syndromes
- Fibromuscular Dysplasia
- Spontaneous Coronary Artery Dissection (SCAD)
- Ehlers-Danlos
- Marfan
- Loeys-Dietz

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In the case of aneurysms detected in patients with SCAD, Marfan, Loeys-Dietz and Ehlers-Danlos Type IV syndromes, a more frequent surveillance pattern along with additional anatomic region imaging may be considered medically necessary as these syndromes demonstrate a higher incidence of aneurysm development and degeneration. Intervention recommendations follow general guidelines for thoracic aortic, abdominal aortic and visceral artery aneurysms once detected.

While duplex imaging remains an effective modality for abdominal aortic surveillance, these conditions often involve the thoracic aorta as well as cerebrovascular and visceral vessel abnormalities that may be technically limited with this approach. Due to the high incidence of aneurysm development in multiple anatomic locations, CT/MR imaging is recommended for surveillance in this population for cases with indeterminate ultrasound imaging.

There is an association between bicuspid aortic valve and thoracic aneurysm development. Individuals diagnosed with this condition should undergo screening and follow standard surveillance patterns using CT/MR of the chest as well as echocardiography should a thoracic aortic aneurysm be detected. The addition of cardiac-specific CT/MR has not shown benefit in these cases as the pathology is usually noted within the aorta.

Multisystemic Smooth Muscle Syndrome [MSMS], Smooth Muscle Dysfunction Syndrome [SMDS] and ACATA2 mutations have a high incidence of aneurysm development early in life and should undergo screening and routine surveillance after genetic confirmation. To minimize radiation exposure in this pediatric population, MR and ultrasound imaging are recommended when possible.

Screening for Vascular Related Genetic Connective Tissue Disorders (PVD-2.2)

Vascular related genetic connective tissue Disorders include:

- Familial Aneurysm Syndromes
- Fibromuscular Dysplasia
- Spontaneous Coronary Artery Dissection (SCAD)
- Ehlers-Danlos
- Marfan
- Loeys-Dietz

Table of Thoracic Aorta Imaging Options

CPT®	Description
71250	Computed tomography, thorax, diagnostic; without contrast material

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CPT®	Description
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography

CPT®	Description
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences
70548	Magnetic resonance angiography, neck; with contrast material(s)
70549	Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences
74185	Magnetic resonance angiography, abdomen, with or without contrast materials
72198	Magnetic resonance angiography, pelvis, with or without contrast materials

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Criteria

Screening for Vascular Abnormalities In Suspected or Known Familial Syndromes

- Aneurysm screening is considered medically necessary in individuals with a positive family history of Familial Syndromes (1st degree relative with dissection/TAA) but no known genetic syndrome/mutation, otherwise known as Suspected Familial Aneurysm Syndrome as follows:
  - ECHO and chest x-ray for all 1st-degree relatives (parents, siblings, children) of individuals with TAA and/or dissection
  - Any imaging listed in the **Table of Thoracic Aorta Imaging Options** is considered medically necessary if these studies identify a TAA, are equivocal, or do not visualize the ascending or descending aorta adequately.
  - Studies can be repeated at 2 year intervals if prior results are negative.
- Aneurysm screening for individuals with a known and documented genetic syndrome/mutation, specifically SCAD/fibromuscular dysplasia/Marfan/Loeys-Dietz/Ehlers-Danlos type IV, imaging is considered medically necessary as follows:
  - On initial diagnosis of Ehlers-Danlos, Loeys-Dietz, Marfan, SCAD, or suspicion of fibromuscular dysplasia, full vascular imaging from head to pelvis with:
    - CTA or MRA Head, and CTA or MRA Neck, or CTA Head and Neck
    - CTA or MRA Chest or CT Chest with contrast,and/or Echocardiogram
    - CTA Abdomen/Pelvis or MRA Abdomen/Pelvis
  - For individuals with Loey-Dietz or Marfan's syndrome, an additional TTE can be obtained 6 months after the initial imaging to determine aortic root and ascending aortic stability.
  - Repeat imaging is considered medically necessary at two-year intervals if there are no identified aneurysms or dissections on initial imaging.

Surveillance for Vascular Abnormalities In Suspected or Known Familial Syndromes

Surveillance imaging for identified aneurysms is considered medically necessary as follows:

- Fibromuscular dysplasia: aneurysm surveillance per the typical time-frame as described in **Thoracic Aortic Aneurysm (TAA) (PVD-6.2)**, **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)**, **Iliac Artery Aneurysm (IAA) (PVD-6.4)**, and **Visceral Artery Aneurysm (PVD-6.5)**.
- SCAD/Marfan/Loeys-Dietz/Ehlers-Danlos type IV:
  - Imaging is considered medically necessary every 6 months once an aneurysm has been identified until a decision has been made to repair.
    - Intracranial aneurysm – CTA or MRA Head

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- Aneurysm of a cervical artery – Carotid duplex or CTA or MRA neck if unable to fully visualize with carotid duplex
- Thoracic aorta – CTA Chest or CT Chest with contrast or without , MRA chest
- Abdominal aneurysm – Abdominal duplex (CPT® 93975/93976/93978/93979/76770/76775)
- Visceral aneurysm – These can be difficult to visualize on duplex. If not visible on duplex, can obtain a CTA or MRA Abdomen and Pelvis.

Background and Supporting Information

Fibromuscular dysplasia and spontaneous coronary artery dissection is diagnosed radiographically. Loeys-Dietz, Marfan, Ehlers-Danlos type IV are diagnosed with genetic testing.

Evidence Discussion

Screening for Vascular Related Genetic Connective Tissue Disorders

Generally, routine screening for peripheral arterial disease in asymptomatic patients is not cost-effective and has not been shown to improve patient outcomes. There are some familial and genetic conditions that may predispose individuals to aneurysmal disease and dissection. In these cases, surveillance imaging has been shown to improve early detection and intervention when indicated. Conditions that may have an elevated risk for vascular disease include:

- Familial Aneurysm Syndromes
- Fibromuscular Dysplasia
- Spontaneous Coronary Artery Dissection (SCAD)
- Ehlers-Danlos
- Marfan
- Loeys-Dietz

In the case of aneurysms detected in patients with SCAD, Marfan, Loeys-Dietz and Ehlers-Danlos Type IV syndromes, a more frequent surveillance pattern along with additional anatomic region imaging may be indicated as these syndromes demonstrate a higher incidence of aneurysm development and degeneration (Schoenhoff et al., 2013; Andras & Ferket,2014). Intervention recommendations follow general guidelines for thoracic aortic, abdominal aortic and visceral artery aneurysms once detected.

While duplex imaging remains an effective modality for abdominal aortic surveillance, these conditions often involve the thoracic aorta as well as cerebrovascular and visceral vessel abnormalities that may be technically limited with this approach. Due to the high incidence of aneurysm development in multiple anatomic locations,

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CT/MR imaging is recommended for surveillance in this population for cases with indeterminate ultrasound imaging.

Screening for TAA with Bicuspid Aortic Valves (PVD-2.3)

Table of Thoracic Aorta Imaging Options

CPT®	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography

Criteria

Screening

- Screening is considered medically necessary in individuals with bicuspid aortic valve:
  - Any requested imaging from the **Table of Thoracic Aorta Imaging Options** and/or ECHO (CPT® 93306, CPT® 93307, or CPT® 93308) may be used for screening
  - First-degree relatives of individuals with bicuspid aortic valve may be screened for TAAFollow-up per TAA Follow-up guidelines in **Thoracic Aortic Aneurysm (TAA) (PVD-6.2)**

Surveillance

For surveillance imaging for no identified aneurysm/dilatation, see **Frequency of Echocardiography Testing (CD-2.3).**

Evidence Discussion

Screening for TAA with Bicuspid Aortic Valves

There is an association between bicuspid aortic valve and thoracic aneurysm development. Individuals diagnosed with this condition should undergo screening and follow standard surveillance patterns using CT/MR of the chest as well as

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echocardiography should a thoracic aortic aneurysm be detected. The addition of cardiac-specific CT/MR has not shown benefit in these cases as the pathology is usually noted within the aorta. If initial imaging is negative for aortic pathology, additional lifetime surveillance imaging is supported with echocardiography.

Screening for Vascular Related Disorders in ACTA2 Mutations (PVD 2.4)

Criteria

Screening for Vascular Related Disorders in Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations

Initial imaging

Upon initial genetic confirmation, all of the following studies are considered medically necessary:

- Transthoracic echocardiogram (TTE)
- MRA Chest or CTA Chest and CT Chest with contrast
- MRA Abdomen and Pelvis (CPT® 74185 and 72198) or CTA Abdomen and Pelvis (CPT® 74174)
- MRI Perfusion study Brain CPT® 70553
- MRA Head and Neck (CPT® 70544 or 70545 AND 70548)
- Ultrasound Upper extremity(ies) (CPT® 93930 or 93931) or CTA Upper extremity (CPT® 73206) or MRA Upper extremity (CPT® 73225)

Repeat testing

Repeat testing with any of the studies listed under initial imaging is considered medically necessary when there is documentation of new signs or symptoms.

Surveillance imaging

Surveillance imaging with any of the studies listed in initial imaging is considered medically necessary according to the following:

- Transthoracic echocardiogram can be repeated every 6 months.
- Chest imaging can be repeated every 12 months starting at age 10.
- Abdomen and pelvis imaging can be repeated every 12 months starting age 10.
- Upper extremity imaging can be repeated every 12 months starting age 10.
- MRI perfusion study Brain see **Dysfunction Syndrome (SMDS)/ACTA2 Mutations (PEDHD-12.8)**

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- MRA Head and Neck see **Dysfunction Syndrome (SMDS)/ACTA2 Mutations (PEDHD-12.8)**

Background and Supporting Information

Smooth Muscle Dysfunction Syndrome presents as congenital mydriasis, a patent ductus arteriosus (PDA), pulmonary arterial hypertension (PAH) during infancy. Patients go on to developed aortic, peripheral arterial, and cerebrovascular disorders in childhood.

- Caused by heterozygous mutation of ACTA2. P.Arg179His
- Cases mostly due to de novo mutations, so imaging screening based on family history without genetic confirmation is not supported.
- Because radiation is a known risk factor for moyamoya disease, MRI/MRA Head is recommended instead of Computed Tomography (CT)/CTA.

Evidence Discussion

Screening for Vascular Related Disorders in Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations

Multisystemic Smooth Muscle Syndrome [MSMS], Smooth Muscle Dysfunction Syndrome [SMDS] and ACATA2 mutations have a high incidence of aneurysm development early in life and should undergo screening and routine surveillance after genetic confirmation. To minimize radiation exposure in this pediatric population, MR and ultrasound imaging are recommended when possible.

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Cerebrovascular Imaging

Guideline

Cerebrovascular and Carotid Disease - Initial Imaging (PVD-3.1)
Surveillance Imaging with NO History of Carotid Surgery or Intervention (PVD-3.2)
Surveillance Imaging WITH History of Carotid Surgery or Intervention (PVD-3.3)
References

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Cerebrovascular and Carotid Disease - Initial Imaging (PVD-3.1)

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CPT®	Description
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences
70547	Magnetic resonance angiography, neck; without contrast material(s)
70548	Magnetic resonance angiography, neck; with contrast material(s)
70549	Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences

Criteria

- Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) is considered medically necessary to evaluate possible carotid artery disease, prior to considering advanced imaging, when ANY of the following apply:
  - Known or suspected retinal arterial emboli or Hollenhorst plaque
  - Pulsatile neck masses
  - Carotid or cervical bruit
  - Abnormal findings on physical exam of the carotid arteries (e.g., absent carotid pulses)
  - Pre-operative evaluation of individuals with evidence of severe diffuse atherosclerosis, scheduled for major cardiovascular surgical procedures

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- Pre-operative evaluation of individuals prior to elective cardiovascular surgery in individuals older than 65 years of age and in those with peripheral artery disease, history of cigarette smoking, history of stroke or TIA, or carotid bruit
- Suspected Subclavian Steal Syndrome for additional imaging see **Upper Extremity PVD – Imaging (PVD-4.1)**
- Blunt neck trauma in the absence of focal neurological symptoms
- Neurologic complaints after chiropractic neck manipulation
- Vasculitis potentially involving carotid arteries, such as Takayasu's arteritis and fibromuscular dysplasia (FMD)
- Remote history of stroke or TIA (greater than one month).

- CTA or MRA Neck is considered medically necessary to evaluate suspected internal carotid artery dissection, in individuals with **any** of the following mechanisms of injury or risk factors for arterial dissection:
  - Chiropractic manipulation of neck
  - Whiplash injury
  - Fibromuscular dysplasia/Marfan
  - Stroke in the young (age ≤50)
- CTA or MRA Neck is considered medically necessary to evaluate suspected vertebrobasilar pathology:
  - Symptoms include:
    - Vertigo associated with nausea and vomiting
    - Diplopia
    - Loss of vision in one or both eyes
    - Dysarthria
    - Bifacial numbness
    - Bilateral extremity weakness and/or numbness
    - Acute changes in mental status
    - Loss of consciousness
    - Ataxia
  - MRA or CTA of **both** Neck and Head are required to visualize the entire vertebral-basilar system for evaluation of posterior circulation disease.
  - Surveillance imaging, post-stenting or known vertebrobasilar disease, interval determined by Vascular Specialist, Neurologist, or Neurosurgeon or any provider in consultation with a vascular specialist, neurologist, or neurosurgeon for ANY of the following:
    - Asymptomatic
    - Unchanged symptoms
    - New or worsening symptoms
- After Intracranial Hemorrhage:

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  - Initial Imaging see **Head Trauma (HD-13.1)** in the Head Imaging Guidelines
  - Surveillance Imaging
    - Interval determined by neurosurgeon or neurologist or any provider in consultation with a neurologist or neurosurgeon.
- Carotid ultrasound screening in asymptomatic individuals due only to risk factors is considered **not** medically necessary.
- Repeat imaging of the cervical vessels (regardless of when the previous carotid imaging was performed) is considered medically necessary for new signs and symptoms consistent with carotid artery disease (e.g., TIA, amaurosis fugax, change in nature of a carotid bruit) using one of the following:
  - Duplex ultrasound (CPT® 93880 bilateral study or CPT® 93882 unilateral study)
  - MRA Neck with contrast or without and with contrast
  - CTA Neck

Evidence Discussion

Cerebrovascular and Carotid Disease- Initial Imaging

Indications for carotid artery imaging are suspicion for carotid stenosis, aneurysm, dissection or vasculitis. The signs and symptoms generally accepted for carotid imaging are listed in the guideline.

Standard first line imaging is the Duplex ultrasound (DU). This study obtains gray-scale pictures, as well as velocity and direction of blood flow in the vessels. The combination of B mode and Doppler techniques allows for detection of all of the above mentioned pathologies. DU has limitations in evaluation of the vertebral artery origins as well as extent of carotid dissection. Therefore, if there is concern for either vertebrobasilar insufficiency or carotid dissection, CT angiography (CTA) or MR angiography (MRA) is supported.

However, DU has become the first-line imaging modality for identifying patients with internal carotid artery stenosis. In part, this is because consensus ultrasound criteria have been developed to standardize carotid ultrasound examinations and categorize carotid artery stenosis severity. The rationale for use of DU is its low cost, availability, and high sensitivity and specificity. It avoids exposure to radiation and intravenous contrast agents as well.

CTA and MRA have more limited use for screening due to the risks associated with them. CTA risks include intravenous contrast and radiation exposure. Contrast complications include allergy and contrast induced nephropathy. MRA risk is related to gadolinium contrast with rare allergic type reactions. The risk of developing nephrogenic systemic fibrosis has diminished very significantly in patients with renal insufficiency with the use of the Group II contrast agents. MRA may be contraindicated in some patients with metallic implants which should be judged on a case by case basis based on local

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protocols. Additionally, both CTA and MRA are not appropriate for screening purposes, due to their considerable costs.

It is well established that for carotid stenosis 70-99% in an asymptomatic patient, or 50-99% stenosis in a symptomatic patient, there is a role for carotid intervention for stroke prevention. Once duplex identifies this degree of stenosis, CTA/MRA is medically necessary for pre-procedure planning. Additionally, CTA/MRA is medically necessary for patients undergoing evaluation for carotid artery stenting (CAS) as delineation of relevant anatomy is necessary for procedural success.

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Surveillance Imaging with NO History of Carotid Surgery or Intervention (PVD-3.2)

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Criteria

- Surveillance imaging is considered medically necessary once a year for individuals with fibromuscular dysplasia of the extracranial internal carotid arteries.
- Reporting standards for carotid stenosis varies widely. The most commonly used criteria, however, is noted in the chart below published by the Society of Radiologists in Ultrasound Consensus Statement in 2003.

Primary parameters			Additional Parameters	
% Stenosis	ICA PSV (cm/sec)	Plaque estimate (%)	ICA/CCA PSV ratio	ICA/EDV (cm/sec)
Normal	< 125	None	< 2.0	< 40
< 50	< 125	< 50	< 2.0	< 40
50-69	125-230	≥ 50	2.0-4.0	40-100
≥ 70 but less than near occlusion	> 230	> 50	> 4.0	> 100
Near occlusion	High, low, or undetectable	Visible	Variable	Variable
Total occlusion	Undetectable	Visible- no detectable lesion	Not applicable	Not applicable

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CPT®	Description
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
93880	Duplex Ultrasound, bilateral
93882	Duplex Ultrasound, unilateral
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences
70547	Magnetic resonance angiography, neck; without contrast material(s)
70548	Magnetic resonance angiography, neck; with contrast material(s)
70549	Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences

- If normal study, no routine follow-up imaging is considered medically necessary.
- If <50% internal carotid stenosis
  - Duplex ultrasound is considered medically necessary every **two** years.
- Between 50% and 70% internal carotid stenosis
  - Duplex ultrasound is considered medically necessary annually.
  - A repeat duplex is considered medically necessary in three to six months until stability is reached when **one** of the following occurs:
    - Change in the character of the bruit
    - Duplex demonstrates rapid progression, including:
      - Doubling of peak systolic velocities in the internal carotid arteries
      - Increase of the ICA/CCA ratio
      - Heavy calcification in the internal carotid arteries
      - Thrombus in the internal carotid arteries
      - Ulcerated plaque in the internal carotid arteries
      - Echolucent plaque in the internal carotid arteries

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  - A one-time CTA Neck (CPT® 70498) or MRA Neck is considered medically necessary to confirm degree of stenosis in individuals with ulcerated plaque or heavy calcification of the internal carotid artery seen on duplex.
- Internal carotid stenosis ≥70% or ICA/CCA ratio >4
  - Duplex ultrasound or MRA Neck with contrast or CTA Neck is considered medically necessary at the following intervals:
    - Every 6 months until one of the following occurs:
      - Intervention is performed.
      - Decision is made to not intervene.
- MRA Neck with contrast or CTA Neck is considered medically necessary if duplex Ultrasound shows ≥70% occlusion/stenosis of the internal carotid artery or the ICA/CCA ratio is >4.0, even with a lower percentage of stenosis.
  - If carotid stent is planned, MRA Head or CTA Head can be added.

Evidence Discussion

Surveillance Imaging with NO History of Carotid Surgery or Intervention

DU is established as the primary diagnostic test for carotid surveillance imaging. Consensus statements have established the appropriate time intervals for repeat imaging. If however, there are new symptoms or physical findings, repeat duplex imaging is supported, regardless of time interval. If at any time there is >70% re-stenosis, CTA or MRA is indicated.

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Surveillance Imaging WITH History of Carotid Surgery or Intervention (PVD-3.3)

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Criteria

- Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) is considered medically necessary post-carotid surgery or intervention at the following intervals:
  - 1 month after procedure
  - Every 6 months for 2 years after procedure
  - Then annually
- If ≥70% residual internal carotid stenosis is seen on duplex at 1 month after procedure
  - Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) or CTA Neck (CPT® 70498) or MRA Neck (CPT® 70548) is considered medically necessary at the following intervals:
    - Every 3-6 months for one year
    - Then annually or until decision is made to re-intervene
- If ≥70% residual internal carotid stenosis is seen on duplex at any time post-procedure, then
  - CTA Neck (CPT® 70498) or MRA Neck (CPT® 70548) is considered medically necessary for further evaluation and at six-month intervals until decision is made to re-intervene.

Background and Supporting Information

- MRA Neck (CPT® 70548) or CTA Neck (CPT® 70498) may be medically necessary if ultrasound is technically difficult or confirmation of the degree of stenosis on ultrasound is needed because an interventional procedure is being considered

Evidence Discussion

Surveillance Imaging WITH History of Carotid Surgery or Intervention

As described in PVD 3.1, Duplex Ultrasound is established as the primary diagnostic test for carotid surveillance imaging. Consensus statements have established the appropriate time intervals for repeat imaging. If however, there are new symptoms or physical findings, repeat duplex imaging is supported, regardless of time interval. If at any time there is >70% re-stenosis, CTA or MRA is indicated.

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Aortic Imaging

Guideline

Aortic Disorders General Information (PVD-6.1)
References
Thoracic Aortic Aneurysm (TAA) (PVD-6.2)
References
Abdominal Aortic Aneurysm (AAA) (PVD-6.3)
References

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Aortic Disorders General Information (PVD-6.1)

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Duplex ultrasound for visceral vascular studies	CPT®
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study.	93975
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study.	93976
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete study.	93978
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; unilateral or limited study.	93979
Ultrasound, abdominal aorta, real time, with image documentation, screening study for abdominal aortic aneurysm (AAA) for AAA screening	76706

Criteria

- In clinical practice, CT, CTA, MRA are considered medically necessary to evaluate for stenosis of these vessels rather than ultrasound (Exception: Duplex ultrasound is considered medically necessary to rule out testicular or ovarian torsion or to evaluate an abdominal bruit or a pulsatile abdominal mass).
- Mesenteric Ischemia
  - See **Mesenteric/Colonic Ischemia (AB-6)** in the Abdomen Imaging Guidelines.

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Thoracic Aortic Aneurysm (TAA) (PVD-6.2)

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TAA Imaging Indications

Table of Thoracic Aorta Imaging Options

CPT®	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography

Criteria

Imaging of the thoracic aorta listed in the table above is considered medically necessary as follows:

- For suspected TAA, any requested imaging from the **Table of Thoracic Aorta Imaging Options** above is considered medically necessary for the following:
  - Abnormalities identified on chest x-ray (abnormality including widened mediastinum, suspicious calcification) or other imaging studies (fluoroscopy, MRI Spine, etc.) abnormality
- Imaging for known thoracic aortic aneurysm can be chosen from the Table of Thoracic Aorta Imaging Options above
- For screening of TAA, see **Screening for Vascular related genetic connective tissue Disorders (PVD-2.2)**

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- For TAA associated with a dissection, see **Aortic and Arterial Dissection and Other Aortic Conditions (PVD-6.7)**
- For known TAA accompanied with chest pain or back pain and suspicion of rupture, any requested imaging from the Table of Thoracic Aorta Imaging Options above
- For thoracic endovascular aortic repair (TEVAR) of thoracic aorta disease either of the following is considered medically necessary:
  - CTA Chest, and/or Abdomen, and/or Pelvis (CPT® 71275, CPT® 74175, CPT® 72191, CPT® 74174)
  - MRA Chest, and/or Abdomen, and/or Pelvis (CPT® 71555, CPT® 74185, CPT® 72198)
- For follow-up of dilated aortic root or ascending aortic aneurysms, any requested imaging from the Table of Thoracic Aorta Imaging Options above is considered medically necessary for the following:
  - For individuals with dilated aortic root or ascending aortic aneurysms <4.0 cm in diameter
    - Repeat imaging annually.
  - For individuals with dilated aortic root or ascending aortic aneurysms ≥4.0 cm
    - Repeat imaging 6 months.
  - TEE is considered medically necessary **only** when imaging with CT or MR is contraindicated.
- For follow-up of descending aortic aneurysms, any requested imaging from the **Table of Thoracic Aorta Imaging Options** above for the following:
  - Medically treated/observation.
    - 3.5cm to 4.4cm TAA can be followed annually.
    - ≥4.5cm TAA can be followed every 6 months.
    - ≥3.0cm TAA when there is concern for growth can have a one-time 3-month interval advanced imaging.
  - TEE is considered medically necessary **only** when imaging with CT or MR is contraindicated.
- Screening in the presence of other aortic aneurysms.
  - In an individual with a known TAA, screening for AAA is considered medically necessary with an abdominal duplex. See **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)**.
  - In an individual with a known AAA, screening for TAA is not supported by sufficient evidence and is considered not medically necessary.
- Screening in individuals with bicuspid aortic valve or familial TAA syndromes. See **Screening for TAA with bicuspid aortic valves (PVD-2.3)**. See **Screening for Vascular related genetic connective tissue Disorders (PVD-2.2)**

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Evidence Discussion

Thoracic aortic aneurysms (TAAs) are progressive vascular dilatations that typically enlarge over time and carry an increased risk of rupture or dissection as diameter expands. Once an aneurysm reaches established size thresholds, the risk of catastrophic complications and associated mortality exceeds that of elective surgical repair. Current American College of Cardiology/American Heart Association (ACC/AHA) guidelines recommend operative intervention for most asymptomatic patients when the diameter of the ascending aorta or aortic arch reaches approximately 5.5 cm, reflecting a critical inflection point in risk–benefit balance (Wang & Desai, 2020; Expert Panel on Vascular Imaging et al., 2018).

Surveillance strategies for ascending and descending TAAs have been well described in major clinical guidelines and cohort studies, emphasizing periodic imaging to assess aneurysm size and growth rate. However, because of the anatomic position of the thoracic aorta within the chest, ultrasonography has limited utility for comprehensive evaluation, particularly for distal segments. As a result, the American College of Radiology (ACR) recommends computed tomography angiography (CTA) or magnetic resonance angiography (MRA) as the most appropriate modalities for diagnosis, surveillance, and preoperative assessment of thoracic aortic disease (Wang & Desai 2020; Expert Panel on Vascular Imaging et al., 2018).

The ACC/AHA further supports the use of transthoracic echocardiography (TTE) for initial evaluation and serial monitoring of the aortic root and proximal ascending aorta, while acknowledging that transesophageal echocardiography (TEE) provides superior visualization of the thoracic aorta when transthoracic imaging windows are inadequate or when more detailed assessment is required (Douglas et al., 2019).

Thoracic aortic aneurysms may occur in isolation but can also extend beyond the diaphragm, to involve the the abdominal aorta. These are considered thoracoabdominal aneurysms. In such cases, abdominal aortic aneurysms should be managed according to their respective surveillance guidelines, although combined imaging is often performed when clinically indicated or during pre-interventional planning. Additionally, patients with heritable connective tissue disorders or familial aortic syndromes have an increased risk of aneurysm formation and progression, necessitating earlier and more frequent imaging surveillance (Wang & Desai, 2020).

Finally, cross-sectional imaging with CT or MR is essential for procedural planning, as most contemporary surgical and endovascular approaches rely on precise anatomic characterization of the entire aorta and its branch vessels (Wang & Desai, 2020).

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Abdominal Aortic Aneurysm (AAA) (PVD-6.3)

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Duplex ultrasound for visceral vascular studies	CPT®
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study.	93975
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study.	93976
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete study.	93978
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; unilateral or limited study.	93979
Ultrasound, abdominal aorta, real time, with image documentation, screening study for abdominal aortic aneurysm (AAA) for AAA screening	76706

Criteria

Screen for AAA

Ultrasound abdominal aorta with any of the studies from the table of Duplex ultrasound for visceral vascular studies is considered medically necessary to screen for AAA as follows:

- One-time screening recommendations for AAA (Ultrasound CPT® 76706)
  - Individuals 65 to 75 years of age with a history of tobacco use
  - Individuals older than 75 years with a history of tobacco use and in otherwise good health who have not previously received a screening ultrasound examination
  - All first-degree relatives of individuals who present with an AAA and are between 65 and 75, or in those older than 75 in good health

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- AAA screening is considered medically necessary with ultrasound (CPT® 76706, 93975, 93976, 93978, or 93979) when there is a documented thoracic aortic aneurysm.
- There is insufficient evidence to support the use of ultrasound or advanced imaging to screen for a thoracic aortic aneurysm in individuals with known abdominal aortic aneurysm.

Survey known AAA

Ultrasound abdominal aorta with any of the studies from the table of duplex ultrasound for visceral vascular studies is medically necessary to survey known AAA as follows:

- Surveillance of AAA with duplex ultrasound (CPT® 76706, 93975, 93976, 93978, 93979)
  - >2.5cm but <3.0cm: 5 years
  - 3.0cm to 3.9cm: 3 year intervals
  - 4.0cm to 4.9cm in a male: every 12 months OR 4.0-4.4cm in a female: every 12 months
  - ≥5.0cm in a male OR ≥4.5cm in a female: every 6 months
  - >5.4cm (or aortic diameter has increased in size by 0.5 cm in six months, or at least 1 cm in a year) may undergo more frequent monitoring and should be evaluated by a Vascular Specialist
- Additional imaging is considered medically necessary as follows:
  - CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen and Pelvis without contrast (CPT® 74176), or CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175), or CTA Pelvis (CPT® 72191).
    - Suspected or known AAA with recent-onset abdominal or back pain, particularly in the presence of a pulsatile epigastric mass or significant risk factors for AAA
    - Pre-operative imaging for AAA repair
    - An inconclusive duplex study due to an individual's anatomy (e.g. body habitus, presence of bowel gas)
- A one-time CTA Chest (CPT® 71275) or CT Chest with contrast (CPT® 71260) is considered medically necessary prior to planned treatment of AAA.

Evaluate a pulsatile abdominal mass

Ultrasound abdominal aorta with any of the studies from the table of Duplex ultrasound for visceral vascular studies is considered medically necessary to evaluate a pulsatile abdominal mass:

- Additional imaging with CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen and Pelvis without contrast (CPT® 74176), CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175), or CTA Pelvis (CPT® 72191) for either:

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- Suspected or known AAA with recent-onset abdominal or back pain, particularly in the presence of a pulsatile epigastric mass or significant risk factors for AAA
- Pre-operative imaging for AAA repair

Evidence Discussion

Abdominal aortic aneurysm (AAA) is a degenerative vascular condition characterized by progressive dilation of the abdominal aorta, most commonly involving the infrarenal segment. AAAs are typically asymptomatic and are most frequently detected incidentally during imaging performed for unrelated indications. Despite their silent presentation, AAAs are clinically significant due to the risk of rupture, which carries a very high mortality rate, with overall survival following rupture estimated at approximately 20% or less (Rescan Collaborators, 2013).

In contrast, symptomatic aneurysms—manifesting as abdominal, back, or flank pain, or a palpable pulsatile abdominal mass—are associated with an increased risk of impending rupture and require urgent evaluation and intervention. Evidence from observational and clinical studies demonstrates that symptomatic aneurysms should generally be repaired promptly due to the substantially elevated rupture risk compared with asymptomatic lesions (Horvath et al., 2022).

Screening for AAA has proven benefit in high-risk populations. The landmark Multicentre Aneurysm Screening Study (MASS) randomized trial demonstrated that ultrasound screening in men aged 65–74 years resulted in a 42% relative reduction in AAA-related mortality over approximately 4 years of follow-up. Long-term follow-up of the same cohort confirmed continued benefit, with sustained reductions in aneurysm-related mortality and modest reductions in all-cause mortality over more than a decade. These findings support targeted screening strategies in populations at elevated risk, particularly older individuals with a history of smoking or other vascular disease. Screening programs rely on the ability of ultrasound to reliably detect aortic dilation, as the modality can visualize the abdominal aorta in nearly all individuals and identify aneurysms (≥3.0 cm) with high accuracy (Thompson et al., 2009).

The natural history of AAA is strongly dependent on aneurysm diameter and growth rate. Small AAAs (3.0–5.4 cm) are generally managed with serial imaging surveillance, as rupture risk at these diameters is relatively low (Rescan Collaborators, 2013).

The RESCAN meta-analysis (JAMA) demonstrated that both aneurysm growth and rupture risk increase progressively with diameter, with rupture risk nearly doubling for every 0.5 cm increase in size. This study also established evidence-based surveillance intervals, showing that longer intervals may be appropriate for smaller aneurysms (e.g., several years for 3.0-cm AAAs), whereas larger aneurysms require more frequent monitoring (Rescan Collaborators, 2013).

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Imaging is central to the diagnosis, surveillance, and management of AAA. Ultrasound is the primary modality for both screening and follow-up due to its safety, accessibility, and cost-effectiveness. It does not expose patients to ionizing radiation or require contrast administration and provides reliable measurements of aneurysm diameter (Rescan Collaborators, 2013).

Meta-analyses have demonstrated that ultrasound has excellent diagnostic accuracy, with pooled sensitivity exceeding 98% and specificity approaching 100% for the detection of AAA. Additionally, newer techniques such as three-dimensional ultrasound show strong agreement with computed tomography (CT) measurements, further supporting its role in longitudinal surveillance (Shaban et al., 2024).

Cross-sectional imaging with CT angiography (CTA) or magnetic resonance angiography (MRA) is typically reserved for preoperative planning or when ultrasound is technically limited. CTA provides detailed three-dimensional visualization of aneurysm morphology, branch vessels, and access anatomy, which is essential for determining suitability for intervention (Chaikof et al., 2018).

Endovascular aneurysm repair (EVAR) has become a widely used treatment for AAA due to its minimally invasive approach and lower perioperative mortality compared with open surgical repair. Randomized controlled trials, including EVAR 1, DREAM, OVER, and ACE, demonstrate a significant early survival advantage with EVAR, largely driven by reduced 30 day mortality (Powell et al., 2017).

Because of these considerations, detailed preprocedural imaging with CTA or MRA is essential to assess anatomic suitability and guide device selection. Furthermore, continued imaging surveillance after EVAR is required to detect complications such as endoleak, graft migration, or aneurysm sac enlargement (Chaikof et al., 2018).

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Dissection

Guideline

Aortic and Arterial Dissection and Other Aortic Conditions (PVD-6.7)
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Aortic and Arterial Dissection and Other Aortic Conditions (PVD-6.7)

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Coding

CPT®	Imaging for Aortic conditions
93880	Carotid duplex
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71270	Computed tomography, thorax, diagnostic; without contrast material, followed by contrast material(s) and further sections
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
74160	Computed tomography, abdomen; with contrast material(s)
74170	Computed tomography, abdomen; without contrast material, followed by contrast material(s) and further sections
74178	Computed tomography, abdomen and pelvis; without contrast material in one or both body regions, followed by contrast material(s) and further sections in one or both body regions
72193	Computed tomography, pelvis; with contrast material(s)
72194	Computed tomography, pelvis; without contrast material, followed by contrast material(s) and further sections

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CPT®	Imaging for Aortic conditions
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences
70547	Magnetic resonance angiography, neck; without contrast material(s)
70548	Magnetic resonance angiography, neck; with contrast material(s)
70549	Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)

Criteria

CTA or MRA of the entire aorta (including arch branches) and extending through the femoral arteries is medically necessary for suspected acute aortic dissection with any of the following study combinations:

- CT Chest **and/or one of the following:**
  - CT Abdomen with or without and with contrast
  - CT Pelvis with or without and with contrast
  - CT Abdomen and Pelvis with or without and with contrast
- CTA Chest and/or **one** of the following:
  - CTA Abdomen
  - CTA Pelvis
  - CTA Abdomen and Pelvis

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- MRA Chest and/or Abdomen and/or Pelvis

Surveillance

Any aortic dissection, regardless of treatment modality (medical or surgical), imaging of the chest, abdomen and pelvis (according to the Imaging for Aortic Conditions table above) is considered medically necessary at the following intervals:

- 1 month after initial diagnosis
- 6 months after initial diagnosis
- 12 months after initial diagnosis
- If stable, annually

In individuals with Marfan syndrome/Loeys-Dietz/Ehlers-Danlos and an aortic dissection, post-dissection imaging of the chest, abdomen and pelvis (according to the Imaging for Aortic Conditions table above) is considered medically necessary as follows:

- 1 month post-dissection
- 3 months post-dissection
- 6 months post-dissection
- 12 months post-dissection
- yearly thereafter

If the dissection extends into the head or neck, any of the following imaging is also considered medically necessary at the same intervals:

- MRA Head and/or MRA Neck or
- Carotid duplex CPT or
- CTA Neck or
- CTA Head or
- CTA Head and Neck

Imaging of asymptomatic and/or incidentally found arterial dissections that do not affect the aorta (such as, iliac arteries, visceral arteries, extracranial arteries) is considered medically necessary according to the general schedule as follows:

- Within one month of diagnosis
- Six months after diagnosis
- 12 months after diagnosis
- No further imaging after 12 months if noted to be stable

Imaging of asymptomatic penetrating aortic ulcers treated medically is medically necessary according to the following time intervals as follows:

- One month after diagnosis
- If stable, every 6 months for 2 years

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- Then at appropriate intervals thereafter (depending on patient age and PAU characteristics) as determined by the provider managing the condition

Evidence Discussion

Aortic and arterial dissection is usually a result of vessel wall damage due to uncontrolled hypertension or physical trauma. Some connective tissue and genetic disorders also carry a higher risk for vessel dissection. Emergent cases usually present with symptoms of impending vessel rupture, organ malperfusion or hemodynamic instability. For these cases, advanced imaging is required for surgical planning. Additional imaging of anatomic regions with suspected involvement are considered necessary in these cases. Acute dissection cases without these features may be observed with medical management until stable.

A chronic arterial dissection will often degenerate into an aneurysm over time. The risk is related to the dissected area of aorta, as well as non-dissected native aortic segments because of underlying medial degeneration. Multiple major studies have been conducted to recommend criteria for intervention based on size and anatomic considerations. Individuals with certain genetic syndromes including Marfan, Loeys-Dietz and Ehlers-Danlos Type IV may be at risk for accelerated vessel degeneration and should undergo more frequent surveillance.

Due to the complex anatomy associated with arterial dissection, CT/MR imaging is recommended over duplex imaging for thoracic, abdominal and visceral artery dissections. Duplex imaging may still be useful for carotid monitoring depending on the extent of vessel involvement.

Asymptomatic arterial dissections not associated with the aorta should undergo regular surveillance for the first year after detection. No further imaging has found to be of benefit if findings remain stable.

Penetrating aortic ulcers are frequently found in the setting of severe aortic atherosclerosis and may carry a significant rupture risk. Frequent surveillance for the first year after detection is medically necessary to determine if intervention is necessary. If the penetrating aortic ulcer remains stable after twelve months, the frequency of imaging may be reduced to annually until intervention is indicated.

Classic symptoms of sharp, severe acute onset of retrosternal or interscapular chest pain is seen in 96% and is best adapted to the emergent setting. Chest x-ray is imprecise; any suspicion should be considered since up to 10% of individuals with aortic dissection present without classic symptoms.

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Post-operative Imaging

Guideline

Post Aortic Endovascular/Open Surgery Surveillance Studies (PVD-6.8)
References
Post-procedure Surveillance Studies (PVD-7.3)
References

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Post Aortic Endovascular/Open Surgery Surveillance Studies (PVD-6.8)

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Open Procedures

Criteria

- Aortic root/ascending aortic procedures for aneurysm (e.g., aortic root repair, arch/ hemi-arch repair, Elephant trunk repair). One of the following post-operative studies [Echocardiography or CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) or CTA Chest (CPT® 71275)], is considered medically necessary as follows:
  - Within 1 year post-operative
  - Then every 5 years
- For aortic root/ascending aortic procedures for dissection see **Aortic and Arterial Dissection and Other Aortic Conditions (PVD-6.7)**
- Open descending thoracic aortic aneurysm repair- **One** of the following post-operative studies [CT Chest with contrast (CPT® 71260) **or** CT Chest without contrast (CPT® 71250) **or** CTA Chest (CPT® 71275)], is considered medically necessary as follows:
  - Within 1 year post-operative
  - Then every 5 years
- Open Aortic Abdominal Aneurysm Repair - contrast and non-contrast enhanced CT of the entire aorta (CPT® 74176, CPT® 74177, CPT® 74174) is considered medically necessary as follows:
  - Within 1 year post-operative
  - Then every 5-years
  - As requested to assess for suspected infection of the graft (see **Vascular Graft Infection (PVD-21)** for additional imaging in vascular graft infection)

Endovascular Procedures

Criteria

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Post-operative surveillance after TEVAR for any indication (PVD-6.8.1)

Imaging for post-operative TEVAR	CPT®
CT Chest, and/or Abdomen, and/or Pelvis	71260 74177 74160 72193
CTA Chest, and/or Abdomen, and/or Pelvis	71275 74175 72191 74174
MRA Chest, and/or Abdomen, and/or Pelvis	71555 74185 72198

Note:

Abdomen and Pelvis imaging is considered medically necessary only if TEVAR performed for a dissection that extends into the abdomen or pelvis

- **Any** of the studies listed in the table above are considered medically necessary for post-operative surveillance imaging after TEVAR as follows:
  - One month
  - Twelve months
  - Then annually for life
- If an endoleak is identified at the 1-month study, more frequent imaging is considered medically necessary as requested.

Post-operative Surveillance After Abdominal EVAR (Endovascular Aneurysm Repair) (PVD-6.8.2)

Criteria

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Imaging for post-operative abdominal EVAR	CPT®
CT Abdomen and/or Pelvis with contrast	74160 72193 74177
CT Abdomen and/or Pelvis without and with contrast	74170 72194 74178
CTA Abdomen and/or Pelvis	74175 72191 74174
MRA Abdomen and/or Pelvis	74185 72198

Post-operative surveillance after abdominal EVAR is considered medically necessary as follows:

- CT (any contrast level) or CTA of the entire aorta at 5-year intervals (CPT® 74176)
- CT as per above coding as requested and color duplex ultrasound (CPT® 93975, CPT® 93976, CPT® 93978, or CPT® 93979) one month after EVAR
- If no endoleak, or sac enlargement, repeat either preferred CT or duplex ultrasound (but not both) at 12 months.
- If a type II endoleak is observed 1 month after EVAR, may approve **both** at 6 months:
  - Any of the above CT with contrast
  - Color duplex US
- If no endoleak or AAA sac enlargement is detected at 1 year after EVAR annual surveillance with:
  - Color duplex US
  - If DGUS is not available, any of the above CT can be performed.
- If a type II endoleak is associated with an aneurysm sac that is shrinking or stable in size:
  - Continue surveillance with color duplex US every 6 months for 2 years
  - Annually thereafter
- If US detects a new endoleak, graft migration, or aneurysm sac growth > 5mm:

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- Any of the above CT scan as requested

Post-endoleak intervention surveillance imaging

Surveillance imaging after EVAR, or any subsequent endoleak intervention, is based on the most recent intervention.

For any subsequent interventions for endoleak repair, imaging is considered medically necessary at 1 month with CT and then follow protocol as above.

Surveillance following Complex EVAR (i.e., a branched/fenestrated graft)

CT as per above coding as requested and/or color duplex ultrasound (CPT® 93975, CPT® 93976, CPT® 93978, or CPT® 93979) is considered medically necessary at 1-month post-operative, 6 months post-operative, 12 months post-operative, and annually thereafter.

A 3 month follow-up study is considered medically necessary if endoleak of aneurysm enlargement is identified at 1-month post-operative.

Endovascular (Stent) Iliac Repair (PVD-6.8.3)

Criteria

Imaging for endovascular iliac repair (stent)	CPT®
CT Pelvis	72193 72194
CTA Pelvis	72191
MRA Pelvis	72198

- One of the above studies is considered medically necessary for endovascular iliac repair (stent).
- If performed in conjunction with EVAR, surveillance will follow the same schedule as EVAR.
- For isolated iliac artery aneurysm repair, surveillance is considered medically necessary with an arterial duplex (CPT® 93975, CPT® 93976, CPT® 93978, or CPT® 93979) or CT or MR as above if duplex unavailable:
  - Post-operatively within the first month
  - 6 months after endovascular treatment

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- Annually

Evidence Discussion

Post Aortic Endovascular/Open Surgery Surveillance Studies

Surgical management of aortic pathology has evolved substantially over the past several decades. Open surgical repair (OSR) remains an important treatment modality, particularly for pathology involving the ascending aorta and for thoracic or abdominal aneurysms with complex anatomy not amenable to endovascular techniques. However, advances in endovascular aortic repair (EVAR) have shifted contemporary practice patterns, with EVAR now frequently preferred for descending thoracic, abdominal, and iliac artery disease when anatomy is suitable. Compared with OSR, EVAR offers a less invasive approach with lower perioperative morbidity and mortality, although long term durability differs between the two strategies (Karanikola et al., 2014).

Postoperative surveillance strategies vary based on both anatomic location and type of repair. Open repair is generally associated with greater long term durability and lower rates of device-related complications, allowing for longer intervals between follow up imaging. In contrast, EVAR requires more intensive and lifelong surveillance due to a higher incidence of late device-related complications and reintervention. This difference reflects the inherent trade-off between the invasiveness of open surgery and the potential for endograft-related failure over time (Expert Panel on Vascular Imaging et al., 2026).

One of the most common complications following EVAR is the development of an endoleak, which occurs when there is persistent blood flow outside the graft but within the aneurysm sac due to incomplete seal or graft failure. Endoleaks are relatively common, occurring in up to approximately 30% of EVAR patients, and can lead to continued pressurization of the aneurysm sac with a subsequent risk of enlargement and rupture. Management depends on endoleak type and sac behavior. Types I and III endoleaks are considered high risk and generally require prompt intervention due to their association with increased rupture risk, whereas many type II endoleaks may be managed conservatively if the aneurysm sac remains stable. However, sac enlargement—typically defined as an increase of more than 5 mm—warrants further evaluation and often reintervention. Patients undergoing secondary repair for endoleaks require continued surveillance, as recurrent complications and late failures may occur (Cifuentes et al., 2023).

Imaging plays a central role in both initial evaluation and long term follow up of aortic disease. For thoracic aortic pathology, cross sectional imaging with computed tomography angiography (CTA) or magnetic resonance imaging (MRI) is typically required due to the limited acoustic windows and anatomic constraints of ultrasound in

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this region. In contrast, surveillance following abdominal EVAR often begins with CTA or MRA in the early postoperative period to confirm appropriate graft positioning, absence of endoleak, and aneurysm sac status. After this baseline evaluation, many patients can transition to duplex ultrasound (DUS)–based surveillance, particularly when the aneurysm sac is stable and no endoleak is present. Ultrasound-based strategies may reduce radiation exposure and contrast use while maintaining acceptable diagnostic performance in selected patients (Karanikola et al., 2014).

Cross sectional imaging with CTA or MRI remains essential when complications are suspected, including endoleak, graft infection, structural graft failure, or aneurysm sac enlargement. These modalities provide superior anatomic detail and are required for preoperative planning if reintervention is being considered (Expert Panel on Vascular Imaging et al., 2026).

Complex endovascular aneurysm repair techniques, including fenestrated and branched EVAR, have further expanded the applicability of minimally invasive approaches to patients with challenging anatomy involving visceral branch vessels. While these approaches offer significant advantages in high risk patients, they are associated with higher rates of secondary intervention and require careful long term surveillance. Although duplex ultrasound may have a role in selected cases, CT based imaging is often necessary to adequately evaluate complex graft configurations and branch vessel patency (Expert Panel on Vascular Imaging et al., 2026).

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Post-procedure Surveillance Studies (PVD-7.3)

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Criteria

- Scheduled Interval
  - ABI (CPT® 93922) following any revascularization procedure
    - ABI (CPT® 93922) or Duplex ultrasound (CPT® 93926 unilateral study) at each routine follow-up is considered medically necessary generally after a history/ physical has been performed.
    - Further imaging studies such as CTA or MRA are considered medically necessary for worsening symptoms, an abnormal duplex or a significant reduction (>0.15) in the ABI.

Indication	Imaging
Suprainguinal Revascularization, both open and endovascular therapy, including Aortobifem/iliofem/fem-fem bypass/iliac angioplasty/stent	• Clinical examination and ABI (CPT® 93922) with arterial duplex (CPT® 93925 or CPT® 93926) is considered medically necessary at: ◦ Within 1 month ◦ 6 months ◦ 12 months ◦ Then annually
Infrainguinal Open Revascularization (Femoral-popliteal, femoral-tibial, femoral-distal bypass)	

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Indication	Imaging
• With vein or autologous conduit	• Clinical exam and ABI (CPT® 93922) with arterial duplex (CPT® 93925 or CPT® 93926) is considered medically necessary at: ◦ Post-operatively ◦ 3 months ◦ 6 months ◦ 12 months ◦ Then annually
• With Prosthetic conduit (PTFE/Dacron)	• Clinical exam and ABI (CPT® 93922) with arterial duplex (CPT® 93925 or CPT® 93926) is considered medically necessary at: ◦ Post-operatively ◦ 6 months ◦ 12 months ◦ Then annually
Infrainguinal Endovascular Revascularization Femoropopliteal angioplasty/stent	• Clinical exam and ABI (CPT® 93922) with arterial duplex (CPT® 93925 or CPT® 93926) is considered medically necessary at: ◦ Within 1 month ◦ 3 month ◦ Every 6 months for two years ◦ Then annually

After Suprainguinal Intervention (PVD-7.3.1)

Criteria

- One of the following studies: Arterial duplex, CTA Abdomen and Pelvis, CT Abdomen and Pelvis with contrast, CTA Aorta with lower extremity runoff, MRI Abdomen and Pelvis, MRA Abdomen and Pelvis, or MRA Aorta with lower extremity runoff is considered medically necessary for any **one** of the following:
  - Worsening signs or symptoms
  - Reduction of ABI >0.15
  - Findings suggestive of high grade stenosis or in-stent re-stenosis

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- Duplex ultrasound finding of peak systolic velocity (PSV) ≥190 cm/s
- Velocity ratio ≥1.5

After Infrainguinal Intervention (PVD-7.3.2)

Criteria

- CTA Lower Extremity (CPT® 73706) or MRA Lower Extremity (CPT® 73725) or CTA Aorta with lower extremity runoff CPT® 75635) is considered medically necessary for any **one** of the following:
  - Worsening signs or symptoms
  - Reduction of ABI >0.15
  - Findings suggestive of high grade stenosis or in-stent re-stenosis
    - Duplex ultrasound finding of peak systolic velocity (PSV) ≥190 cm/s
    - Velocity ratio ≥1.5
  - Findings suggestive of threatened graft (Low graft velocity <45 cm/s)
- If intervention was performed for a non-healing wound and wound has gone on to heal, additional imaging is considered **not** medically necessary for surveillance.
- Repeat arterial duplex imaging can be obtained for worsening clinical signs and symptoms such as the presence of a new wound or rest pain.

Evidence Discussion

Following either open surgical or endovascular revascularization for peripheral arterial disease, structured surveillance is recommended. The primary objective of post-intervention follow-up is to maintain vessel or graft patency, thereby preventing recurrent ischemic symptoms and reducing the risk of limb loss or amputation. Surveillance strategies typically incorporate serial clinical assessment in combination with noninvasive hemodynamic and imaging modalities, most commonly ankle–brachial index (ABI) measurements and duplex ultrasound (DUS) (Zierler et al., 2018).

Duplex ultrasound and ABI surveillance allow for early detection of restenosis, graft stenosis, or progression of disease before clinical deterioration occurs, enabling timely reintervention and improved limb salvage outcomes. Evidence suggests that DUS surveillance is associated with improved primary assisted patency and may reduce major amputation rates following both surgical bypass and endovascular intervention (McKenna et al., 2025; Tsitsou et al., 2026).

The frequency and modality of surveillance vary depending on procedural factors, including whether the intervention was endovascular (e.g., angioplasty or stenting) or open (e.g., bypass grafting), as well as the conduit type in surgical bypass (autogenous

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vein versus prosthetic graft). In general, more intensive surveillance protocols are often applied after bypass grafting—particularly vein grafts—given the risk of stenotic lesion development, whereas endovascular interventions also require routine follow-up to monitor for restenosis or loss of patency. Surveillance intervals are typically individualized, but commonly include early postoperative imaging followed by periodic assessments (e.g., at 1, 3, 6, and 12 months and annually thereafter) to ensure ongoing durability of the intervention (Shih et al.,2024; Abu Dabrh et al., 2017).

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Vasculitis

Guideline

Large Vessel Vasculitis (PVD-6.9)
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Small Vessel Vasculitis (PVD-6.11)
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Inflammatory Aortitis (PVD-6.9.1)

Imaging for Inflammatory Aortitis	CPT®
CTA Chest	71275
MRA Chest	71555
CTA Pelvis	72191
MRA Pelvis	72198
CTA Abdomen and Pelvis	74174
CTA Abdomen	74175
MRA Abdomen	74185

Criteria

Initial imaging

- Initial imaging with CTA or MRA of the affected body region is considered medically necessary when clinical evaluation leads to the suspicion of inflammatory aortitis.

Repeat imaging

- Follow-up imaging with CTA or MRA of the affected body region is considered medically necessary for:
  - Change in signs/symptoms
  - Known aneurysm monitoring
    - See **Cerebral Aneurysm and AVM (HD-12)** in the Head Imaging Guidelines
    - See **TAA Imaging Indications**
    - See **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)**

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Giant Cell Arteritis (GCA) (PVD-6.9.2)

CPT®	Imaging for Giant Cell Arteritis
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences
70547	Magnetic resonance angiography, neck; without contrast material(s)
70548	Magnetic resonance angiography, neck; with contrast material(s)
70549	Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
73725	Magnetic resonance angiography, lower extremity, with or without contrast material(s)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh

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CPT®	Imaging for Giant Cell Arteritis
78816	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; whole body

Criteria

Initial imaging

Cranial GCA is the more common type with temporal artery involvement. For predominantly Cranial GCA, the following studies are considered medically necessary for initial imaging:

- US (CPT® 93880 or CPT® 93882) of the temporal (and or axillary) arteries is the preferred modality where available.
- MRA Head and/or MRA Neck when **either** of the following apply:
  - Vascular trained ultrasonography is not available.
  - US is negative or equivocal with a clinical suspicion of GCA.
- MRA of the Abdomen and/or Lower extremities when involvement suspected clinically
- PET/CT Whole Body is considered medically necessary when MRA or US are equivocal and one of the following conditions exists:
  - Temporal artery biopsy is negative and GCA is still suspected.
  - where the result would change clinical management
- US of the neck vessels (CPT® 93880 or CPT® 93882) and MRA Chest

Note:

For suspected cerebral vasculitis in individuals with neurological symptoms, see **Cerebral Vasculitis (HD-22)** in the Head Imaging Guidelines

Extra-cranial GCA: less commonly encountered. None of the “classic” clinical signs or symptoms of cranial GCA are present initially but may develop later.

- Extra-cranial GCA is characterized by at least two or more of the following:
  - Jaw and/or upper extremity claudication
  - Fever/weight loss or fever of unknown origin (FUO) symptoms
  - New murmurs
  - Pulse asymmetry
  - Abdominal pain
  - Pulsatile mass
  - High inflammatory markers such as CRP or ESR > 50 mm/h
- Medically necessary imaging for aortic root, arch or abdomen involvement:

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- MRA Chest, MRA Neck , MRA Abdomen , CTA Chest , CTA Neck or CTA Abdomen
- PET/CT Skull base to mid thigh if MRA or CTA are non-diagnostic and there is still suspicion for aortic root, arch or abdomen involvement

Repeat imaging

- Follow-up imaging is considered medically necessary for **any** of the following:
  - One-time documentation of remission or disease control
  - Change in signs/symptoms suggesting progression of disease
  - Although individuals with GCA can develop aortic aneurysms over time, screening in the absence of signs or symptoms is considered not medically necessary.
  - In individuals with known thoracic or abdominal aortic aneurysm:
    - See **TAA Imaging Indications** for thoracic aneurysm surveillance
    - See **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)** for abdominal aneurysm surveillance.
- Follow-up imaging is not considered medically necessary for individuals in clinical and biochemical remission or without aneurysm/complication.

Takayasu's Arteritis (PVD-6.9.3)

CPT®	Imaging for Takayasu's Arteritis
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)

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CPT®	Imaging for Takayasu's Arteritis
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh

Criteria

Initial imaging

- Initial imaging is considered medically necessary for signs and symptoms suggestive of disease such as absent radial pulse, difficulty obtaining BP in one arm, or unexplained hypertension.
- Initial staging PET-CT is considered medically necessary in place of MRA or CTA of multiple areas when diffuse large vessel involvement, or occult vessel involvement, is suspected.
- Any of the following modalities are medically necessary for evaluation of Takayasu's arteritis:
  - MRA of the affected body area(s) (contrast as requested)
  - CTA of the affected body area(s) (contrast as requested)
  - Ultrasound with Doppler of the affected body area(s)

Repeat imaging

Repeat imaging with any CTA or MRA in the above table is considered medically necessary at the following intervals:

- Every 3 months to monitor treatment response during active treatment with systemic therapy
- Annually for surveillance of known involved body areas to detect progressive vascular damage that may require intervention

Evidence Discussion

Large Vessel Vasculitis

Large vessel vasculitis is generally sub-grouped into three areas:

- Aortitis (Inflammatory Aortitis)
- Giant Cell Vasculitis
- Takayasu's Arteritis

Initial diagnosis of large vessel vasculitis (Inflammatory aortitis, Giant cell, and Takayasu's arteritis) should be made through history, physical exam and laboratory values including inflammatory markers. In cases of suspected large vessel disease,

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ultrasound, CT/ and MR imaging of the neck/chest/abdomen/pelvis are considered medically necessary. PET imaging should be reserved for cases where CT/MR are non-diagnostic and the likelihood of disease based on other factors is high.

PET imaging has recently been incorporated into the American College of Rheumatology GL for the Diagnosis of GCA, for research purposes and to exclude alternate diagnosis(Ponte et al.,2022). PET can be utilized in the rare instances MRA or US are equivocal, temporal artery biopsy is negative and GCA is still suspected, or where the result would change clinical management(Expert Panel on Vascular Imaging et al., 2021; Dejaco et al.,2024)

Aortic arch involvement is common (see below); US of the neck vessels and MRA of the chest may also be considered in initial screening. Abdominal involvement is less common in GCA, but common in Takayasu's arteritis (see below). MRA of the abdomen and/or LE's, may also be considered in initial screening when involvement suspected clinically (Ponte et al., 2022, Dejaco et al. 2024).

Aortitis

Aortitis may be congenital (Marfan, Hypermobility Syndromes, others) or acquired, including traumatic, atherosclerotic (dissecting aneurysm, other), infectious (syphilis, tuberculosis, other), neoplastic or inflammatory (Ankylosing Spondylitis, Giant Cell Arteritis, Cogan's, Relapsing Polychondritis, Behcet's Syndrome, Polyarteritis Nodosa, Granulomatous Polyangiitis, Lupoid, idiopathic, other).

Giant Cell Arteritis

Historically, GCA had been be subdivided into two basic types: cranial predominant and extra-cranial. Currently, both GCA type vasculitis and Takayasu's arteritis have similar management requirements as variants of large vessel vasculitis (LVV).

Initial diagnosis of large vessel vasculitis (Inflammatory aortitis, Giant cell, and Takayasu's arteritis) should be made through history, physical exam and laboratory values including inflammatory markers. In cases of suspected large vessel disease, ultrasound, CT/ and MR imaging of the neck/chest/abdomen/pelvis are considered medically necessary. PET imaging should be reserved for cases where CT/MR are non-diagnostic and the likelihood of disease based on other factors is high. Follow-up imaging is considered medically necessary for individuals with known aneurysmal disease or who remain symptomatic on active therapy. PET imaging has recently been incorporated into the American College of Rheumatology GL for the Diagnosis of GCA, for research purposes and to exclude alternate diagnosis (Ponte et al., 2022).

Takayasu's Arteritis

Instead of multiple MRA's, an initial staging PET-CT can be approved where diffuse large vessel involvement, or occult vessel involvement, is suspected in an LVV.

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Ordering both studies initially is discouraged. Follow-up MRA is preferred as PET-CT in some patients may never normalize. For Takayasu's arteritis, annual surveillance in the absence of symptoms is recommended due to the high risk of progressive vascular damage.

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Small Vessel Vasculitis (PVD-6.11)

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Criteria

- Advanced imaging is not sensitive enough to detect changes in small vessels and is considered not medically necessary for primary assessment of any small vessel vasculitis.
- End-organ damage can occur with several of the small vessel vasculitides and are addressed in this guideline:
  - Henoch-Schönlein Purpura (HSP)
  - Granulomatosis with polyangiitis (GPA, formerly known as Wegener's granulomatosis)
  - Eosinophilic granulomatosis with polyangiitis (EGPA, formerly known as ChurgStrauss Syndrome)
  - Immune complex associated small-vessel vasculitis [immunoglobulin A–associated vasculitis (IgAV)]

IgA Vasculitis Henoch-Schönlein Purpura (HSP)

Criteria

Initial imaging

Ultrasound (US) Abdomen (CPT® 76700) is considered medically necessary to evaluate possible gastrointestinal complications of known or suspected HSP including **any** of the following:

- Bowel wall edema and hemorrhage
- Intussusception

CT Abdomen with contrast (CPT® 74160) is considered medically necessary if additional information is needed after ultrasound for management.

Repeat imaging

US Abdomen (CPT® 76700) is considered medically necessary for known HSP to evaluate new or worsening gastrointestinal symptoms.

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Background and Supporting Information

Henoch-Schönlein Purpura (HSP) is the most common vasculitis of childhood, mainly involving small blood vessels.

Granulomatosis with Polyangiitis (GPA) Formerly Wegener's Granulomatosis

Criteria

Initial Imaging

Initial imaging as a baseline prior to starting immunosuppressive therapy is considered medically necessary in all individuals who are newly diagnosed or suspected of having antineutrophil cytoplasmic autoantibody (ANCA)-associated vasculitides (AAV) with either or both of the following to evaluate the extent of the disease:

- CT Sinuses (CPT® 70486) and/or
- CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260)

Note:

Preferred CT imaging in individuals with AAV should be performed without an iodinated contrast agent administered.

Repeat Imaging

CT Sinuses (CPT® 70486) and/or CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) are considered medically necessary for **any** of the following:

- New or worsening clinical symptoms affecting the body area requested
- Assess response to medical therapy when a change in treatment regimen is being considered
- Annually-to evaluate the extent of disease

Eosinophilic Granulomatosis with Polyangiitis (EGPA) Formerly Churg-Strauss Syndrome

Criteria

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Initial Imaging

- CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) is considered medically necessary in the initial evaluation of Eosinophilic granulomatosis with polyangiitis (EGPA) formerly known as Churg-Strauss Syndrome.

Repeat Imaging

- CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) is considered medically necessary for any of the following:
  - New or worsening clinical symptoms affecting the body area requested
  - Assess response to medical therapy when a change in treatment regimen is being considered
  - Annually-to evaluate the extent of disease

Immune Complex Associated Small-vessel Vasculitis

Criteria

Initial Imaging

- Doppler ultrasound (US) of the affected body part (most commonly abdomen) is considered medically necessary in the initial evaluation of immune complex associated small-vessel vasculitis.

Repeat Imaging

- Doppler ultrasound (US) of the affected body part (most commonly abdomen) is considered medically necessary in the following circumstances:
  - New or worsening clinical symptoms affecting the body area requested
  - To assess response to medical therapy when a change in treatment is being considered
  - Annually-to evaluate the extent of disease

Evidence Discussion

Small Vessel Vasculitis

Advanced imaging is not routinely needed with diagnosis of small vessel vasculitis. In suspected cases, clinical assessment of end-organ damage is usually indicated in both the adult and pediatric population

Initial diagnostic workup should include history, physical exam, and laboratory data including inflammatory markers. End-organ damage may involve multiple organ systems based on the type of vasculitis. For individuals with suspected disease, ultrasound, CT and MR imaging of the affected anatomic regions may be indicated.

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Annual surveillance in the absence of symptoms is still recommended due to the high risk of progressive vascular damage.

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Peripheral Artery Aneurysms

Guideline

Visceral Artery Aneurysm (PVD-6.5)
References
Iliac Artery Aneurysm (IAA) (PVD-6.4)
References
Lower Extremity Artery Aneurysms (PVD-7.4)
References

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Visceral Artery Aneurysm (PVD-6.5)

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Criteria

Treatment is generally considered medically necessaryfor visceral aneurysms ≥2cm. Imaging of visceral artery aneurysms for initial evaluation or for treatment planning is considered medically necessary as follows:

- Initial imaging of calcifications seen on plain film imaging suspicious for visceral artery aneurysms (spleen, kidney, liver or intestines) with ultrasound (CPT® 76700, 76705, 93975, 93976, 93978, or 93979), **or** CTA Abdomen (CPT® 74175), **or** CT Abdomen with contrast (CPT® 74160)
- MRA Abdomen (CPT® 74185) without contrast in place of CTA or CT Abdomen in pediatric individuals or when there is a contraindication to contrast materials (i.e., renal insufficiency, contrast allergy, pregnancy)
- Ultrasound (CPT® 76700,76705, 93975, 93976, 93978, or 93979) **or** CTA Abdomen (CPT® 74175) **or** CT Abdomen with contrast (CPT® 74160) is considered medically necessary for further monitoring based on the intervals below or **as determined by a vascular specialist or any provider in consultation with a vascular specialist**:
  - Splenic artery aneurysms:
    - <20mm can be imaged every three years
    - 20mm to 29mm can be imaged annually
    - If ≥30mm, they should be referred for treatment, either stent, excision or splenectomy
  - For all other visceral artery aneurysms:
    - Initial evaluation with six-month follow-up for one year
    - Further follow-up annually if no significant enlargement is seen
- CTA Abdomen (CPT® 74175), MRA Abdomen (CPT® 74185), or CT Abdomen with contrast (CPT® 74160) is considered medically necessary following stent placement at:
  - 1 month
  - 6 months
  - 12 months
  - Then every year

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Evidence Discussion

Aneurysmal disease, besides primarily involving the large vessels, can also affect medium and smaller sized vessels. Visceral cases are uncommon and occasionally are associated with certain connective tissue and genetic disorders. They are often found incidentally on imaging. Ultrasound, CT, or CTA imaging may be indicated for surveillance in these cases. Due to the anatomic location of the visceral vessels, duplex ultrasound may have technical limitations. Consideration of best surveillance study should be decided on initial imaging and whether a certain modality is felt to provide diagnostic information. Example; some splenic arterial aneurysms may be diagnostic with US but others may be obscured by bowel gas requiring CT/CTA. Splenic artery aneurysms, the most common (60%), tend to exhibit very slow rates of growth, while the other visceral artery aneurysms are more unpredictable in their rate of growth with a greater tendency to rupture. Visceral Artery Aneurysms are defined by an increase of more than 50% of the original arterial diameter and include hepatic, renal and intestinal artery aneurysms.

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Iliac Artery Aneurysm (IAA) (PVD-6.4)

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Criteria

- Ultrasound (CPT® 76882 or CPT® 93925) is considered medically necessary for evaluation of a suspected IAA.
  - CT Pelvis with contrast (CPT® 72193) if ultrasound is equivocal
  - Ultrasound for follow-up imaging annually if an aneurysm is ≥2cm
- Additional Imaging
  - CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen and Pelvis without and with contrast (CPT® 74178), or CTA Abdomen and Pelvis (CPT® 74174) is considered medically necessary for preoperative imaging if endovascular or open repair is being considered.

Background and Supporting Information

- Isolated IAAs are rare and are typically associated with AAA.
- Approximately one third to one half of isolated IAAs are bilateral at time of presentation.
- Abdominal Aortic aneurysm rupture usually occurs at a diameter of 5 cm or larger, whereas common iliac aneurysms that are less than 3 cm in diameter almost never rupture.

Evidence Discussion

Annual surveillance of iliac artery aneurysms is medically necessary to determine when intervention is necessary if an iliac aneurysm exceeds 2cm in diameter. Duplex ultrasound is the primary imaging modality for individuals without technical limitations related to body habitus. It has been demonstrated to be accurate, cost-effective, and does not use ionizing radiation or contrast. CT imaging may be indicated for cases where ultrasound is equivocal or for surgical planning.

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Lower Extremity Artery Aneurysms (PVD-7.4)

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Imaging Indications

Criteria

Iliac Artery Aneurysm

See **Iliac Artery Aneurysm (IAA) (PVD-6.4)**

Femoral Artery Aneurysm

- Initial imaging is considered medically necessary as follows:
  - Ultrasound (CPT® 93925 bilateral study or CPT® 93926 unilateral study).
- Surveillance imaging is considered medically necessary as follows:
  - Asymptomatic true femoral aneurysms smaller than 2.5 cm in diameter
    - Ultrasound (CPT® 93926 unilateral study) annually
  - Asymptomatic true femoral aneurysms larger than 2.5 cm
    - Ultrasound (CPT® 93926 unilateral study) every 6 months
- Other imaging is considered medically necessary as follows:
  - CTA or MRA Lower extremity (CPT® 73706 or 73725 or 74198 or 75635):
    - Pre-operative study for individuals with no plans for invasive angiography
    - Technically limited or abnormal ultrasound results

Popliteal Artery Aneurysm

- Initial imaging is considered medically necessary as follows:
  - Ultrasound (CPT® 93925 bilateral study or CPT® 93926 unilateral study) and Ultrasound to assess for a contralateral popliteal aneurysm and abdominal aortic aneurysm (CPT® 76770 or CPT® 76775)
- Surveillance imaging is considered medically necessary as follows:
  - If no intervention: Ultrasound (CPT® 93926 unilateral study) annually
  - Post-intervention: (ABI (CPT® 93922) and Duplex ultrasound are considered medically necessaryas follows:
    - 3 months post-operative
    - 6 months post-operative

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    - 12 months post-operative
    - Then annually
- Other imaging is considered medically necessary as follows:
  - CTA or MRA (CPT® 73706 or 73725 or 74185 or 75635) for:
    - Pre-operative study
    - Technically limited or abnormal ultrasound results

Evidence Discussion

Duplex ultrasound is the preferred modality for surveillance of lower extremity arterial aneurysms. This modality uses no ionizing radiation or contrast, has a reasonable level of accuracy, and is cost-effective. CT/MR imaging may be indicated for preoperative planning or in cases where ultrasound is technically limited.

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Peripheral Arterial Imaging

Guideline

Upper Extremity PVD – Imaging (PVD-4.1)
References
Renovascular Hypertension/Renal Artery Stenosis (PVD-6.6)
References
Median Arcuate Ligament Syndrome, Nutcracker Syndrome and Other Abdominal Vascular Compression Syndromes (PVD-18)
References
Claudication and Critical Limb Ischemia (PVD-7.1)
References
Popliteal Artery Entrapment Syndrome (PVD-7.2)
References
Arterial Imaging for Free Flaps in Reconstructive Surgery (PVD-7.5)
References (PVD-7.5)
Arteriovenous Malformations (AVMs) (PVD-9.1)
References

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Upper Extremity PVD – Imaging (PVD-4.1)

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Criteria

Initial Imaging

For arterial insufficiency, arterial ultrasound upper extremities (CPT® 93930 or CPT® 93931) is considered medically necessary for signs and symptoms of arterial insufficiency including:

- Arm or hand claudication
- Bluish discoloration of the hand or fingers
- Unilateral cold, painful, pulseless hand
- Non-healing wound (>2 weeks with no healing or evidence of healing) or frank gangrene
- CTA Upper extremity (CPT® 73206) or MRA of Upper extremity (CPT® 73225), **and/or** CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) is considered medically necessary for:
  - Abnormal arterial ultrasound results
  - Equivocal arterial ultrasound results
  - Pre-operative planning

For Subclavian Steal Syndrome, the following studies are considered medically necessary:

- Carotid duplex (CPT® 93882) is the initial and definitive imaging study.
- CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) for carotid duplex showing reversal of flow in one of the vertebral arteries
- Surveillance of subclavian arterial disease is considered **not** medically necessary if there has not been any intervention such as a carotid-subclavian bypass or subclavian stent.

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If the carotid duplex is not diagnostic for reversal of flow in the ipsilateral vertebral artery, then neurological symptoms should be evaluated according to the Head Imaging guideline.

For suspected Fibromuscular Dysplasia of the brachial artery, medically necessary studies include:

- MRA Upper extremity (CPT® 73225)
- CTA Upper extremity (CPT® 73206)
- Arterial Ultrasound (CPT® 93930 bilateral study or CPT® 93931 unilateral study)

For arterial thoracic outlet syndrome, medically necessary studies include:

- CTA Chest (CPT® 71275) (preferred study) or MRA Chest (CPT® 71555) (preferred study) or CT Chest either without or with contrast (CPT® 71250 or CPT® 71260) or MRI Chest with contrast (CPT® 71551)
- For venous thoracic outlet syndrome see **Upper Extremity Venous – Imaging (PVD-4.2)**
- For neurogenic thoracic outlet syndrome see **Brachial Plexus (PN-4.1)**

Post-revascularization

- Arterial Duplex (CPT® 93931) is considered medically necessary following upper extremity arterial revascularization at:
  - Baseline (within one month)
  - 6 months
  - Then annually if stable
  - Any time for new or worsening symptoms of arterial insufficiency

Evidence Discussion

Upper extremity PVD

Duplex ultrasound (DU) is the initial imaging modality for assessment of patients with symptoms of upper extremity arterial occlusive disease including arm/hand claudication, non-healing wounds, blue discoloration, or a unilateral cold, painful, and pulseless hand.

DU is a non-invasive, cost-effective method for screening for arterial disease of the upper extremity. It has high sensitivity and specificity when compared to CT angiography (CTA) and MR angiography (MRA). CTA and MRA also evaluate anatomic location of disease but are reserved for confirmed vascular disease, suspected fibromuscular dysplasia of the brachial artery, and/or pre-operative planning. They are not first line imaging studies due to the higher risks associated with their use and the cost.

Post-revascularization surveillance with DU has been established as a reliable method to monitor the intervention for recurrence of disease. The time intervals for surveillance

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have been established at one and six months post-intervention, then yearly. If at any time, there are new signs or symptoms of disease, repeat duplex imaging is supported.

If initial duplex demonstrates high-grade stenosis or occlusion of the subclavian artery, advanced imaging is NOT indicated unless the individual is symptomatic with arm claudication or signs of hypo-perfusion of the vertebral artery with recurrent dizziness.

Subclavian Steal refers to a hemodynamically significant stenosis or occlusion of the subclavian/innominate artery which results in the reversal of blood flow in the vertebral artery (VA). Signs/Symptoms associated with this syndrome include:

- Physical examination with a >15mmHg discrepancy in blood pressure between two arms
- Supraclavicular bruit
- Symptoms of vertebrobasilar insufficiency, including vertigo and limb paresthesia particularly with use of the ipsilateral arm

Thoracic outlet syndrome (TOS) refers to compression of the neurovascular structures within the thoracic outlet as they pass from the neck and thorax to the axilla.

- There are three types of TOS: neurogenic, arterial and venous.
- Neurogenic TOS refer to **Brachial Plexus (PN-4.1)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging
- Venous TOS refer to **Upper Extremity Venous Imaging (PVD 4.2)**

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Renovascular Hypertension/Renal Artery Stenosis (PVD-6.6)

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Criteria

Initial imaging

- MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) or US kidney retroperitoneal (CPT® 76775) and/or Doppler (CPT® 93975, 93976, 93978, or 93979 if expertise is available) are considered medically necessary when there is documentation of **any** of the following:
  - Individual is adherent to full doses of three blood pressure medications (including a diuretic) yet has still not achieved goal
  - Sudden and persistent worsening of previously controlled hypertension
  - Onset of hypertension younger than 30 years of age
  - Malignant hypertension with coexistent evidence of acute end-organ damage (acute renal failure, new visual or neurological disturbance and/or advanced retinopathy) or flash pulmonary edema
  - Individuals who develop hypertension (≥140/90) within the first 20 weeks of pregnancy when hypertension persists >12 weeks post-partum
  - New or worsening renal function/increasing creatinine (especially after the administration of an ACE inhibitor or with angiotensin receptor blocking agent)
- Carotid duplex (CPT® 93880) is considered medically necessary to screen for carotid involvement in individuals with documented or highly suspicious renal artery stenosis due to fibromuscular dysplasia (mostly women between 15 and 50 years of age).

Screening

CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) is considered medically necessary to screen for renovascular fibromuscular dysplasia in hypertensive individuals with documented cervicocephalic fibromuscular dysplasia. The assessment of other vascular beds should be considered if supported by suggestive symptoms or medical history.

Carotid duplex (CPT® 93880) is considered medically necessary to screen for carotid involvement in individuals with documented or highly suspicious renal artery stenosis due to fibromuscular dysplasia (mostly women between 15 and 50 years of age).

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Repeat imaging post revascularization

- CTA Abdomen (CPT® 74175), or MRA Abdomen (CPT® 74185), or CT Abdomen with contrast (CPT® 74160) is considered medically necessary after stent placement at the following intervals:
  - 1 month post-procedure
  - 6 months post-procedure
  - 12 months post-procedure
  - Then annually

Evidence Discussion

Renovascular Hypertension

The American Heart Association 2017 guidelines on hypertension estimated renovascular disease to be the source of 5-34% of all cases. Multiple studies have shown that intervention is not more effective than medical therapy in most cases as reviewed by the KDIGO conference in 2022; however, it is noted that these recommendations continue to evolve. While duplex ultrasound is the preferred imaging modality, patients with compromised renal function or technical limitations due to body habitus may require CT/MR imaging for monitoring.

Current recommendations for renal artery screening in the setting of hypertension refractory to medical therapy include the following:

- Individual is adherent to full doses of three blood pressure medications (including a diuretic) yet has still not achieved goal
- Sudden and persistent worsening of previously controlled hypertension
- Onset of hypertension younger than 30 years of age
- Malignant hypertension with coexistent evidence of acute end-organ damage (acute renal failure, new visual or neurological disturbance and/or advanced retinopathy) or flash pulmonary edema
- Individuals who develop hypertension (≥140/90) within the first 20 weeks of pregnancy when hypertension persists >12 weeks post-partum o New or worsening renal function/increasing creatinine (especially after the administration of an ACE inhibitor or with angiotensin receptor blocking agent)

Fibromuscular dysplasia carries a higher risk of concomitant renal and carotid artery involvement. Screening of both anatomic regions is considered medically necessary upon diagnosis.

Post-intervention imaging with CT/MR imaging at standard 1/6/12 month intervals followed by annual imaging to assess for stent patency follow standard recommendations for non-coronary interventions. Additional surveillance is not indicated in the absence of symptoms.

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Renal artery revascularization has not been shown to be more effective than medical therapy in most situations and should not be pursued except in extreme cases, or if there is concern for Takayasu arteritis or fibromuscular dysplasia. Gadolinium agents may be contraindicated in individuals with severe renal disease or on dialysis due to the risk of developing nephrogenic systemic sclerosis.

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Median Arcuate Ligament Syndrome, Nutcracker Syndrome and Other Abdominal Vascular Compression Syndromes (PVD-18)

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Median Arcuate Ligament Syndrome

Codes included

CPT®	Description
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image post-processing
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
93975	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study
93976	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study

Criteria

Initial Imaging

- Duplex Doppler Ultrasound of Mesenteric Arteries (CPT® 93975 or 93976) is considered medically necessary as the initial imaging.
- CTA or MRA Abdomen (CPT® 74175 or 74185) is considered medically necessary for **either**:
  - US results are equivocal
  - Pre-operative planning

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Repeat Imaging

- Surveillance imaging is considered **not** medically necessary post-operatively in the absence of abdominal symptoms.

Evidence Discussion

Median arcuate ligament syndrome (MALS) is a non-atherosclerotic cause of chronic mesenteric ischemia.

Patients are typically younger with an average age range of 30-50 years old and a female to male ratio of 4:1.

Patients may have symptoms of postprandial abdominal pain, nausea, vomiting, food aversion, or weight loss. Symptoms are nonspecific, so MALS may be considered a diagnosis of exclusion.

Imaging will demonstrate compression of the celiac artery by fibers of the median arcuate ligament, but this is a nonspecific finding and may be seen in the asymptomatic population.

The condition is believed to be mediated by foregut ischemia caused by compression of the celiac artery, as well as neuropathic pain arising from compression of the celiac ganglion.

Treatment is generally surgical, via a variety of approaches.

Left Renal Vein Compression ("Nutcracker") Syndrome

Codes included

CPT®	description
93975	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study
93976	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image post-processing
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)

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CPT®	description
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)

Criteria

Initial Imaging

- Abdominal duplex (CPT® 93975 or 93976) is considered medically necessary as the initial imaging to confirm left renal vein compression syndrome.
- CTV or MRV Abdomen and Pelvis (CPT® 74174) or (CPT® 74185 and 72198) is considered medically necessary for pre-operative planning when left renal vein compression syndrome is confirmed by duplex ultrasound.

Repeat imaging

- Post-operative follow-up imaging is considered **not** medically necessary in the absence of symptomatology.

Background and Supporting Information

Patients may present with symptoms related to compression of the left renal vein between the aorta and superior mesenteric artery. A less common presentation ("posterior nutcracker syndrome") is related to compression of a retroaortic (or circumaortic) left renal vein between the aorta and vertebral body.

The radiologic finding may be asymptomatic or considered a normal variant.

Signs/symptoms may include hematuria, proteinuria, flank pain, pelvic congestion/ associated pain in females, varicocele in males.

There may be an overlap in symptom complex with individuals who have pelvic congestion syndrome, iliac vein compression (May-Thurner).

There is no single accepted treatment modality. Approaches will range from conservative/medical (especially in younger patients), to endovascular, to open/ laparoscopic/robotic surgical.

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Claudication and Critical Limb Ischemia (PVD-7.1)

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Criteria

- Resting ABI for initial evaluation of suspected PAD. This can be accomplished at the bedside as part of the physical examination or requested as CPT® 93922 (limited Doppler ultrasound) or CPT® 93923 (multi-level complete Doppler ultrasound).
  - CPT® 93923 is considered medically necessary once.
  - Follow-up studies are considered medically necessary with CPT® 93922.
  - Post-exercise ABI (CPT® 93924) is considered medically necessary if the resting ABI is >0.89 and PAD is still highly suspected clinically.
- History and physical suggestive of PAD include:
  - History
    - Claudication- reproducible calf or thigh cramping with exertion that is relieved completely with rest
    - Critical limb ischemia
    - Rest pain suggestive of ischemia-pain in the ball of foot when the leg is in an elevated position particularly at night
    - Distal non-healing wound or punched out ulcer with sharply demarcated edges present for >2 weeks with no evidence of healing, i.e., presence of granulation tissue
  - Physical Examination
    - Abnormal lower extremity pulse examination
    - Vascular bruit
    - Non-healing lower extremity wound
    - Lower extremity gangrene
    - Other suggestive lower extremity physical findings (e.g., elevation pallor/ dependent rubor)
    - Atrophic nails, hair loss, shiny skin
- If resting ABI (CPT® 93922) is normal (0.9 to 1.3) and disease is still suspected:
  - Differentiate from “pseudoclaudication”. See **Lumbar Spinal Stenosis (SP-9)** in the Spine Imaging Guidelines
  - Re-measure ABI after exercise (CPT® 93924)
  - A TBI (toe-brachial index) may be used as further screening in individuals with ABI’s ≥1.4.

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- Advanced imaging is considered medically necessary only if there is consideration for invasive therapy, not to confirm diagnosis.

- Duplex ultrasound (CPT® 93925 bilateral study or CPT® 93926 unilateral study) and Doppler studies are adjuncts to abnormal ABI that are considered medically necessary to identify location and extent of disease once there has been a decision for revascularization.
- MRA Aorta and Pelvic vessels, and Lower extremities (CPT® 74185, CPT® 73725 and CPT® 73725), or CTA with run-off (CPT® 75635) are considered medically necessary **after** an abnormal ABI or abnormal arterial duplex study for **ANY** of the following:
  - Potentially limb-threatening vascular disease evidenced by:
    - Skin breakdown
    - Non-healing ischemic ulcers
    - Resting leg pain
    - Gangrene
  - Blue Toe Syndrome:
    - Hyperviscosity syndrome
    - Hypercoagulable states
    - Vasculitis
    - Emboli from aortic plaque or mural thrombus
      - To evaluate for an embolic source, the following studies are considered medically necessary
        - CTA chest (CPT® 71275) OR MRA Chest (CPT® 71555) AND
        - CTA abdomen and pelvis (CPT® 74174), CTA aorta with run-off (CPT® 75635), MRA abdomen and pelvis (CPT® 74185 and CPT® 72198), OR MRA abdomen with run off (CPT® 74185, CPT® 73725 and CPT® 73725)
        - See also **Transthoracic Echocardiography (TTE) Indications/Initial Evaluation (CD-2.2)**, **Transesophageal Echocardiography (TEE)-Indications (CD-2.5)**, **CT Heart for Evaluation of Cardiac Structure and Morphology (CD-4.6)**
  - Pre-operative planning for intermittent claudication (i.e., non-limb threatening ischemia) AND there is documentation of both of the following:
    - Failed 3-months of conservative medical therapy (physician supervised walking/ exercise program plus medical therapy)
    - Functional disability (e.g., exercise impairment sufficient to threaten the individual's employment or to require significant alterations in the individual's lifestyle)
  - CTA Lower Extremity (CPT® 73706) OR MRA Lower Extremity (CPT® 73725) is considered medically necessary for evaluation of PVD when aortoiliac disease

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is not a concern or the state of the aorta and iliac arteries is already known as documented in the clinical history.

Note:

MRA Pelvis (CPT® 72198) should not be requested/billed with CPT® 74185, CPT® 73725 and CPT® 73725.

Evidence Discussion

Peripheral arterial disease (PAD) is a chronic, progressive atherosclerotic disorder characterized by partial or complete obstruction of arteries supplying the lower extremities. Although PAD affects a large population worldwide, the majority of individuals remain asymptomatic, with only a minority developing clinically evident disease such as intermittent claudication (IC), ischemic rest pain, or tissue loss (Writing Committee Members et al., 2024; Horvath, 2022).

The natural history of PAD is generally favorable in asymptomatic patients and those with IC. Longitudinal studies suggest that only a small proportion of asymptomatic individuals progress to IC over time, and even among patients with IC, progression to chronic limb threatening ischemia (CLTI) or limb loss is uncommon. Consistent with this, patients with IC have a low annual risk of major amputation, typically well below 1%, reflecting the relatively benign limb-related course of claudication in most cases.

Given this favorable prognosis, first-line management for IC emphasizes conservative strategies, including aggressive cardiovascular risk factor modification (e.g., smoking cessation, lipid and blood pressure control) and structured exercise therapy. Supervised exercise therapy has been shown to significantly improve functional capacity and walking distance, with randomized trials and meta-analyses demonstrating improvements of approximately 50% to 200% compared with usual care, with benefits sustained over time. With optimal medical therapy and lifestyle modification, only a small minority of patients progress to advanced ischemia requiring revascularization or amputation (Writing Committee Members et al., 2024).

The ankle–brachial index (ABI) is the primary noninvasive diagnostic test for PAD and is recommended as the initial evaluation in patients with suspected disease. An ABI value of <0.90 is diagnostic of PAD and corresponds to hemodynamically significant arterial stenosis, with reported sensitivity of approximately 75%–79% and specificity up to 96% when compared with angiographic standards. The ABI is inexpensive, widely available, and avoids both ionizing radiation and contrast exposure, making it well suited for outpatient use (Writing Committee Members et al., 2024).

When PAD is confirmed and further anatomical detail is required, arterial duplex ultrasonography is typically the next step. Duplex ultrasound combines B mode imaging with Doppler spectral analysis to assess vascular anatomy and hemodynamics and

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has demonstrated diagnostic accuracy comparable to advanced imaging modalities in many settings. It is noninvasive, cost-effective, and avoids radiation and contrast administration (Writing Committee Members et al., 2024).

Advanced imaging techniques—including computed tomography angiography (CTA), magnetic resonance angiography (MRA), and catheter-based angiography (CA)—are generally reserved for patients being considered for revascularization. CTA offers high spatial resolution but involves exposure to ionizing radiation and iodinated contrast, which carries risks of allergic reactions and contrast-induced nephropathy. MRA provides excellent vascular visualization without radiation; however, gadolinium-based contrast agents may rarely cause allergic reactions and have historically been associated with nephrogenic systemic fibrosis in patients with severe renal dysfunction, although this risk has been substantially reduced with newer agents. Additionally, MRA may be contraindicated in some patients with incompatible metallic implants (ACR Manual on Contrast Media, 2026).

Catheter angiography remains the gold standard for vascular imaging but is invasive and associated with procedural risks, including arterial injury, embolization, thrombosis, and complications related to vascular access, as well as radiation and contrast exposure (Pollack et al. 2012).

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Popliteal Artery Entrapment Syndrome (PVD-7.2)

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Criteria

- Diagnosis of popliteal artery stenosis or occlusion due to compression by adjacent muscle and tendons all of the following are considered medically necessary:
  - Resting ABI (CPT® 93922 OR 93923) AND/OR Post-Exercise ABI (CPT® 93924) AND
  - Ultrasound (CPT® 93926 unilateral study) AND
  - Either CTA Lower Extremity (CPT® 73706), or MRA Lower Extremity (CPT® 73725).
  - CT or MRI Lower Extremity (contrast as requested) if requested by the operating surgeon

Evidence Discussion

Popliteal Artery Entrapment

Popliteal artery entrapment syndrome is a nonatheromatous cause of lower extremity ischemic symptoms. It is caused by abnormal embryologic development of the structures in the popliteal fossa. The symptoms are caused by compression of the popliteal artery by the muscles or fibrous bands. The typical presentation is claudication symptoms in physically active young men who have normal pulse examination.

Popliteal artery entrapment syndrome is typically seen in young men (age 20 to 40) but is not exclusive to this gender or age group.

Due to its unusual nature and presentation, ultrasound, CT Angiography, or MR Angiography of the lower extremity is supported for diagnosis. Since it is critical to understand the anatomic relationships of the muscles to the vessels in the popliteal fossa, CT or MRI of the lower extremity is supported if requested by the surgeon for pre-operative planning.

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Arterial Imaging for Free Flaps in Reconstructive Surgery (PVD-7.5)

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Criteria

- Breast reconstruction preoperative planning: See **Breast Reconstruction (BR-3)** in the Breast Imaging Guidelines
- Head and neck reconstruction: CTA or MRA of bilateral lower extremities, CTA aorta with run-off, or MRA abdomen with bilateral lower extremity MRA is considered medically necessary to evaluate the peroneal artery for planned fibular flap.

Evidence Discussion

The fibular free flap is the preferable flap for mandibular reconstruction (Le, 2022) . Its use can be limited by variations in vascular anatomy, peripheral vascular disease affecting the lower extremities, or previous trauma/surgery involving the donor site. This flap is based on the peroneal artery, whose absence, typically does not affect the pedal circulation. However, there are vascular variants which can compromise the circulation of the foot (Abou-Foul 2017; Holze 2010; Kim 1989). When these anatomical variants are encountered, the flaps and/or the limbs can be compromised. Pre-operative mapping of both legs is critical to identifying these variants, choosing the best reconstructive plan and preventing surgical and donor site complications (Ma et al., 2021; Abou-Foul et al., 2017).

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Arteriovenous Malformations (AVMs) (PVD-9.1)

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- See **Pulmonary AVMs (CH-24.1)** in the Chest Imaging Guidelines
- See **Arteriovenous Malformations (AVMs) and Related Lesions (HD 12.2)** in the Head Imaging Guidelines
- See **Arteriovenous Malformations (AVMs) and Fistulas (PEDPVD-2.5)** in the Pediatric Peripheral Vascular Disease Imaging Guidelines
- See **Pelvic Pain/Dyspareunia, Female (PV-11.1)** in the Pelvis Imaging Guidelines

Criteria

Initial imaging

- Ultrasound with Doppler is considered medically necessary as an initial examination for superficial lesions in the limbs.
  - Large lesion characterization may be limited by ultrasound imaging window.
  - Ultrasound is also limited in evaluating AVM relationship to airway or bony structures.

Evaluation and surveillance

- MRI without contrast or without and with contrast of the affected body part is the study of choice for abdominal AVMs and deep tissue (below the skin) AVMs in the limbs.
- MRA (contrast as requested) of the affected body part is considered medically necessary for evaluation and surveillance of known AVMs.
- It is unusual for both MRI and MRA to be necessary for routine treatment response or surveillance imaging of AVMs, but both may be considered medically necessary for pre-operative planning.
- CT and CTA can also be used to characterize AVMs and their relationship to normal structures but is generally not better than MRI and has associated radiation risks.
  - CT with contrast and/or CTA (contrast as requested) of the affected body part is considered medically necessary when MRI and/or MRA is inconclusive or contraindicated.

Post-embolization

- Advanced imaging is considered medically necessary one-time post-embolization to evaluate for successful resolution of the AVM.

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- Additional imaging (same study performed pre-procedure or as requested by the treating provider) is considered medically necessary for treatment planning purposes if resolution of the AVM was not achieved.

Background and Supporting Information

Arteriovenous malformations are characterized by a network of multiple abnormal vascular channels interposed between enlarged feeding arteries and draining veins. The arteriovenous fistula has a single communication interposed between a feeding artery and a draining vein. The normal capillary bed is absent in both lesions. Both lesions may have an aggressive clinical course and are characterized by a reddish pulsatile mass which has a thrill or bruit. Though often recognized at birth, these lesions may grow and present near adolescence.

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Complications

Guideline

Vascular Graft Infection (PVD-21)
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Suspected Retroperitoneal Bleed (PVD-20)
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Vascular Graft Infection (PVD-21)

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Suspected or Known Vascular Graft Infection

Criteria

Clinical concern for vascular graft infection

Imaging of the affected vascular segment is considered medically necessary for the diagnosis of suspected vascular graft infection and/or treatment planning for known vascular graft infection as follows:

- Duplex arterial ultrasound and/or CTA or MRA of the affected arterial segment
- CTA or MRA of proximal and/or distal vascular beds of the affected segment for operative planning as requested by the surgeon (or provider in consultation with the performing surgeon)
- Indium 111 (111In)–labeled white blood cell (WBC) or Gallium-67 citrate studies (CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803)
- PET/CT (CPT® 78815) for clinical suspicion of aortic infection (graft or native aorta) when **both** of the following apply:
  - CT-angiogram is equivocal/indeterminate AND
  - Indium-111 or Gallium-67 studies have not been performed **and** are not available or not technically feasible.

Evidence Discussion

Infection of vascular grafts is uncommon but serious and potentially life-threatening. Clinical presentations are variable, and imaging may be necessary to identify and/or define extent of infection, as well as for surgical planning.

Ultrasound is an inexpensive imaging modality that may identify findings associated with infection, such as fluid collections and pseudoaneurysm. This method is a considered a reasonable first-line modality to image extracavitary infection, but utility in evaluating intracavitary grafts and associated infection is limited.

CTA is a commonly used modality to evaluate intracavitary grafts, but is also useful in evaluating extracavitary graft, especially for surgical planning. Disadvantages include contrast exposure, and limited sensitivity/specificity.

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MRI may also be useful in evaluating vascular grafts and allows for good soft tissue resolution. Disadvantages include generally higher cost than CT scan, longer acquisition times, and limitations in use when patients have intracardiac devices and/or renal disease.

WBC scintigraphy, as well as PET/CT scan, allow for more definitive identification of infection, compared with CT scans. WBC scintigraphy may be limited due to the time needed for the study; while PET/CT may be limited due to low specificity.

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Suspected Retroperitoneal Bleed (PVD-20)

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Criteria

Imaging

Any of the following studies is considered medically necessary to evaluate for retroperitoneal bleed:

- CT Abdomen and Pelvis with contrast (CPT® 74177)
- CT Abdomen and Pelvis with and without contrast (CPT® 74178)
- CTA Abdomen and Pelvis (CPT® 74174)

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Venous Procedures

Guideline

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IVC Filters – Treatment (PVD-16.2)
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Post Iliac Vein Stenting/Angioplasty (PVD-17.1)
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Imaging for Hemodialysis Access (PVD-8)

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Arterial Evaluation and Venous Mapping Prior to AV Fistula (PVD-8.1)

Criteria

- Imaging prior to AV fistula creation is considered medically necessary:
  - For vessel mapping CPT® 93985 or 93986
  - MRA Upper Extremity (CPT® 73225) may be needed if duplex imaging is equivocal.
- Arterial evaluation to assess arterial suitability (size, degree of stenosis and calcification) prior to AV fistula creation is considered medically necessary as follows:
  - CPT® 93930 or CPT® 93931 can be used to report upper extremity arterial evaluation.
- Venous mapping (CPT® 93970 or CPT® 93971) is considered medically necessary to assess venous suitability prior to AV fistula creation.

Hemodialysis Access Imaging (PVD-8.2)

Criteria

- Indications for Duplex ultrasound (CPT® 93990) of hemodialysis access include but are not limited to:
  - Individuals with decreased flow rates during hemodialysis
  - Development of arm swelling or discomfort after access placement surgery or a hemodialysis session
  - Prolonged immaturity of a surgically created AV fistula
  - Suspected pseudoaneurysm
  - Suspected AV fistula or graft stenosis
  - Known or suspected fluid collection adjacent to an AV fistula or graft
  - One Duplex US (CPT® 93990) can be performed after a surgically created AV fistula for assessment, although it is not generally needed.
- Central venous stenosis can cause new dialysis access to fail to mature or cause the premature failure of existing fistulas/grafts.

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- CT Chest with contrast (CPT® 71260), or CTA Chest (CPT® 71275), or MRA Chest (CPT® 71555) is considered medically necessary when there is documentation of either:
  - Signs and symptoms of central venous stenosis including:
    - Arm swelling
    - Presence of numerous collateral veins
    - Prolonged bleeding from dialysis puncture sites
  - A history of pacemaker placement or previous tunneled dialysis graft, regardless of signs and symptoms

Evidence Discussion

Hemodialysis Access for creation and maintenance

Hemodialysis access imaging is required to assess options for creation of hemodialysis access as well as to evaluate for maturation, failure and complications related to the access and outflow central veins.

Prior to creation of a native arteriovenous fistula (AVF), venous duplex ultrasound should be performed of both upper extremities to assess for adequate vein for fistula creation on all patients. Vessel mapping should include arterial inflow assessment to assess size, degree of stenosis and areas of calcification that may exclude access creation. Advanced imaging (CT or MR) of the chest or upper extremity may be indicated to further assess abnormalities identified on duplex imaging or evidence of central venous outflow obstruction.

Duplex evaluation of hemodialysis access should be performed for patients with evidence of failed maturation, poor function of access or complication related to the use of the hemodialysis access by history, physical exam or functional parameters during dialysis. These parameters may include: elevated venous pressures, inefficient dialysis, and recirculation greater than 10-15% or decreased flow.

CT or MR of the chest may be indicated for patients with a history of central venous catheters or pacemaker/ICD wires, signs and symptoms of ipsilateral central venous stenosis including arm swelling, venous collaterals or prolonged bleeding after dialysis.

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IVC Filters – Treatment (PVD-16.2)

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Criteria

- Prior to IVC filter insertion
  - An initial venous duplex is considered medically necessary to assess for the presence of thrombus in the femoral vein which would affect the approach (transjugular or transfemoral)
- For consideration of removal, CT or CTA Abdomen and Pelvis (CPT® 74177 or, 74174) is considered medically necessary for **any** of the following:
  - A KUB demonstrates tilting of the filter or malposition of one of the filter struts
  - New bilateral lower extremity swelling (venous duplex should be performed first)
  - Filter present for >12 months, with documentation stating intent to remove

Background and Supporting Information

- IVC filters are placed in individuals with known DVT that cannot be anti-coagulated, individuals with poor pulmonary reserve and high risk for DVT, or prophylaxis in trauma and surgical individuals.
- Most IVC filters inserted are retrievable and should be removed as soon as clinically feasible. After 12 months, removal of IVC filters can become technically more difficult.

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Post Iliac Vein Stenting/Angioplasty (PVD-17.1)

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Criteria

Iliac venous stents can be placed after thrombolysis for DVT associated with May-Thurner's syndrome, DVT associated with extrinsic compression or for post thrombotic iliac obstruction.

- Duplex ultrasound is considered medically necessary as the initial evaluation for iliac venous stents for any of the following:
  - Surveillance of iliac venous stents
  - Worsening signs or symptoms including increased edema when stent malfunction is suspected
  - Post-operatively within the first month, at six months, twelve months, and then annually
- CTV or MRV Abdomen and Pelvis are considered medically necessary for an abnormal or indeterminate duplex.

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Venous Imaging

Guideline

Upper Extremity Venous – Imaging (PVD-4.2)
References
Acute Limb Swelling (PVD-12)
References

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Upper Extremity Venous – Imaging (PVD-4.2)

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Criteria

Venous Insufficiency

- For symptoms of venous insufficiency including but not limited to unilateral pain and swelling of the upper extremity
  - Venous duplex upper extremities (CPT® 93970 or CPT® 93971) is considered medically necessary initially
  - If duplex ultrasound is non-diagnostic, the following studies are considered medically necessary:
    - MRV Upper extremity (CPT® 73225) and/or MRV Chest (CPT® 71555), or
    - CTV Upper extremity (CPT® 73206) and/or CTV Chest (CPT® 71275)
- For venous thoracic outlet syndrome, CTV Upper extremity (CPT 73206) or MRV Upper extremity (CPT 73225), and/or CTV Chest (CPT 71275) or MRV Chest (CPT 71555) is considered medically necessary.
  - For arterial thoracic outlet syndrome see **Upper Extremity PVD – Imaging (PVD-4.1**)
  - For neurogenic thoracic outlet syndrome see **Brachial Plexus (PN-4.1)**
- CT Chest with contrast (CPT® 71260) is considered medically necessary for Superior Vena Cava Syndrome (upper extremity and facial symptoms).
- **Either** of the following is considered medically necessary when stenting of the SVC is being considered:
  - MRV Chest (CPT® 71555)
  - CTV Chest (CPT® 71275)

Lymphedema of the Upper Extremity

When initial imaging with venous duplex has ruled out DVT, **either** of the following studies are considered medically necessary to evaluate for suspected lymphedema of the upper extremity:

- Lymphoscintigraphy (CPT® 78195)
- MR lymphangiography (CPT® 75801)

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Pre-operative Imaging for Lymphedema Surgery

Any/all of the following imaging studies are considered medically necessary for pre-operative imaging for physiologic lymphatic surgery (lymphovenous bypass or vascularized lymph node transfer):

- Lymphoscintigraphy
- ICG lymphoscintigraphy
- MR lymphangiography
- MRV of upper extremity and draining bed (MRV chest for upper extremity surgery)

Evidence Discussion

Upper Extremity Venous Imaging

Duplex ultrasound is the initial imaging modality for assessment of patients with symptoms of upper extremity venous occlusive disease or venous insufficiency including arm edema, pain and ulceration. Duplex imaging is limited in assessment of the proximal subclavian vein and central veins due to anatomic interference by the rib cage and lungs. MRV or CTV is considered medically necessary to assess these more proximal segments of the venous outflow and central venous structures including the innominate veins and SVC.

Advanced imaging is considered medically necessary for treatment planning in SVC syndrome and proximal venous intervention. Follow-up imaging after PTA and/or stenting for SVC syndrome or proximal vein occlusive disease may be approved assessment of stent patency and for recurrent symptoms.

SVC syndrome is caused by acute or subacute, intrinsic or extrinsic obstruction of the SVC, (ex: lung cancer, fibrosis, indwelling catheters/devices, thrombus). Other symptoms include dyspnea, headache and dizziness.

Thoracic Outlet Syndrome (TOS) refers to compression of the neurovascular structures within the thoracic outlet as they pass from the neck and thorax to the axilla. There are three types of TOS, neurogenic (see Brachial plexus-PN 4.1), venous and arterial (see Upper Extremity PVD-PVD 4.1). Venous TOS typically occurs in young athlete after a history of exertion of the limb, or in the presence of a central venous catheter which traverses the subclavian vein.

Lymphedema is caused by dysfunction of the lymphatic system. Primary lymphedema is a result of a congenital malformation of the lymphatic system, whereas secondary lymphedema is due to an exogenous cause that impairs the lymphatic system. Typical etiologies include trauma, chronic infection, cancer treatments including lymph node dissections and radiation therapy. Most cases of secondary lymphedema of the upper extremity are related to breast cancer and it's treatment. Due to the anatomic disruption

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of the lymphatic system, there is accumulation of protein-rich interstitial fluid, persistent swelling and later fibro-adipose hypertrophy.

There are two categories of surgical management for lymphedema. Reductive/ablative techniques involve the direct excision or liposuction of the affected lymphedematous tissue. Physiologic techniques involve restoring lymphatic flow by creating alternative pathways for lymphatic flow out of the affected limb. The two major types of physiologic techniques are the lymphovenous bypass (LVB), and the vascularized lymph node transfer (VLNT).

Pre-operative imaging is necessary for surgical planning for the physiologic procedures. Lymphoscintigraphy can confirm the diagnosis, and identifies pre-operative and post-operative lymph node activity. ICG lymphoscintigraphy allows for pre-operative staging of lymphedema and maps the functional lymphatic channels. This study is limited to imaging of the superficial lymphatic channels. However, MR lymphangiography images the deeper lymphatic channels and may also be indicated pre-operatively. MRV is used for the evaluation of the venous system, to assess the fat and fluid composition of the limb, and to rule out occult malignancy. Identification of venous lesions is particularly important, as these outflow lesions may be contributing to the limb edema, and could compromise the success of the procedure if not corrected.

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Acute Limb Swelling (PVD-12)

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Superficial Venous Thrombosis (SVT) (PVD-12.1)

Criteria

- The diagnosis of superficial venous thrombosis is generally made on the basis of physical examination.
  - Duplex ultrasound (CPT® 93970, CPT® 93971) is considered medically necessary as the initial imaging if the diagnosis is equivocal
  - Follow-up duplex ultrasound (CPT® 93970, CPT® 93971) is considered medically necessary only if thrombus in the superficial systems is encroaching onto the deep venous system (saphenofemoral or saphenopopliteal junction)

Background and Supporting Information

Superficial venous thrombosis (SVT) refers to acute or chronic thrombosis of the superficial veins in both the upper (cephalic and basilic veins) and lower extremities (greater [great] saphenous vein, lesser [small] saphenous vein). Treatment: Elevation and warm compresses until pain and swelling subsides.

Acute Deep Venous Thrombosis (DVT) (PVD-12.2)

Criteria

- Duplex ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is considered medically necessary as the initial imaging study for any suspected DVT
  - Deep venous thrombosis can present as
    - Symptomatic
      - Swelling
      - Pain
      - Warmth
      - Erythema
      - Pain with dorsiflexion of the foot (Homan's Sign)
      - Or with progression, such as phlegmasia cerulean dolens

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  - Risk factors for DVT include age >40, obesity, malignancy, prolonged immobilization, hypercoagulability as well as those outlined in **Pulmonary Embolism (PE) (CH-25)** in Chest Imaging Guidelines.
- CTA/CTV Abdomen and pelvis with contrast are considered medically necessary to rule out IVC thrombus secondary to the filter when there is acute bilateral lower extremity swelling in an individual with a history of an IVC filter in place.
- When there is concern for proximal DVT (iliofemoral):
  - Focused abdominal duplex can generally visualize the iliac veins and IVC to determine the absence or presence of iliac vein thrombus in an individual. If the results are equivocal or indeterminate:
    - CTV or MRV Abdomen and Pelvis with contrast (CPT® 74174 or CPT® 74185 and 73725) is considered medically necessary.
- For request concerning abdominal vein thrombosis, see **Abdominal Veins other than Hepatic and Portal Veins (AB-43.2)** in the Abdomen Imaging Guidelines
- For proximal DVT's (iliac vein DVT's or in cases of phlegmasia (extensive DVT compromising arterial inflow), thrombectomy (rarely performed) or thrombolysis is considered medically necessary.
- If the cause of the DVT is found to be due to May-Thurner, see also **May-Thurner Syndrome (PVD-13.3)**

Background and Supporting Information

Deep venous thrombosis is characterized by thrombosis of a deep vein in either the upper (brachial, axillary, subclavian veins) or the lower extremity (soleus muscle veins, gastrocnemius muscle veins, peroneal, posterior tibial, popliteal, femoral or iliac veins).

Follow-up Imaging of Known DVT (PVD-12.3)

Criteria

- A repeat duplex ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is considered medically necessary in order to rule out proximal extension of a calf vein DVT in individuals who cannot be anticoagulated as follows:
  - One week after the initial diagnosis.
  - Serial imaging (up to 3 studies) over the first three weeks if calf DVT is not treated.
- The use of imaging during long-term anticoagulation therapy to determine venous recanalization or for the purpose of determining whether or not to continue anticoagulation therapy is not supported by medical evidence and is considered not medically necessary.
- The use of imaging for surveillance of ovarian vein thrombosis is not supported by medical evidence and is considered not medically necessary.

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Evidence Discussion

Ovarian vein thrombosis usually occurs in the setting of pregnancy and the post-partum period, or secondary to abdominal surgery, intra-abdominal infections or GYN malignancies. When diagnosed, these are treated with standard anticoagulation. Based on the available evidence, recanalization rate of the vessel after treatment is approximately 90%. There is no consensus on follow-up imaging for this condition (Riva et al., 2024; Monnet et al. 2024; Laouenan et al., 2025).

Follow-up Imaging After Venous Surgery (PVD-12.4)

Criteria

- Venous duplex (CPT® 93971 unilateral study) of the treated limb is considered medically necessary to rule out a DVT within seven days of endovenous ablation.
- Follow-up routine imaging is considered **not** medically necessary after other venous procedures including:
  - Saphenous vein ligation and stripping
  - Phlebectomy
  - Sclerotherapy

Generalized Bilateral Lower Extremity Edema (PVD-12.5)

Criteria

Pre-operative Imaging for Lymphedema Surgery

Bilateral lower extremity edema is multifactorial. Prior to any request for advanced imaging, a workup for causes of the edema should be instituted including echocardiogram to rule out congestive heart failure and laboratory studies to exclude renal insufficiency and liver disease, **and a venous duplex to rule out DVT and venous insuffiency.** If all testing is nondiagnostic, the following advanced imaging may be considered.

- Suspected abdominal or pelvic pathology
  - Abdominal ultrasound or duplex is the initial imaging
  - CT Abdomen and Pelvis or CT pelvis either with or without contrast can be performed if abdominal US is equivocal or indeterminate
- Suspected lymphedema
  - When initial noninvasive studies, such as ultrasound, are negative for venous valvular insufficiency **either** of the following advanced imaging studies is indicated:
    - Lymphoscintigraphy (CPT® 78195)

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- MRI lymphangiography (CPT® 73718)

Any/all of the following imaging studies are considered medically necessary for pre-operative imaging for physiologic lymphatic surgery (lymphovenous bypass or vascularized lymph node transfer):

- Lymphoscintigraphy
- ICG lymphoscintigraphy
- MR lymphangiography
- MRV of lower extremity and draining bed (MRV abdomen and pelvis for lower extremity surgery)

Unilateral Lower Extremity Edema (PVD-12.6)

Criteria

Initial imaging for unilateral lower extremity edema with duplex ultrasound (CPT® 93971, unilateral study) to rule out DVT and venous insufficiency is considered medically necessary.

- If there is concern for proximal DVT:
  - focused abdominal duplex to evaluate the iliac veins and IVC
  - CTV or MRV Abdomen and Pelvis (CPT® 74174 or CPT® 74185 and CPT® 72198) for indeterminate or equivocal duplex results.
- If there is concern for abdominal or pelvic pathology:
  - Abdominal/pelvic ultrasound or duplex
  - CT Abdomen and Pelvis, or CT Pelvis with or without contrast if the abdominal ultrasound is indeterminate or inconclusive

Background and Supporting Information

Unilateral edema favors localized causes of venous or lymphatic compromise, rather than systemic etiologies which tend to result in bilateral edema. Initial imaging is duplex ultrasound. This can assess for vascular and non-vascular causes, including DVT, venous reflux, popliteal cysts, hematoma, mass.

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Chronic Limb Swelling

Guideline

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Chronic Limb Swelling Due to Chronic Deep Venous Thrombosis (DVT)/May-Thurner Syndrome (PVD-13)

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Chronic DVT with Incompletely Lysed or Residual DVT (PVD-13.1)

Criteria

Individuals with incompletely lysed or residual DVT can develop post-thrombotic syndrome that can be characterized as chronic edema, venous stasis changes, pain, and in advanced cases, venous stasis ulceration.

- Imaging is considered medically necessary to evaluate for iliac venous obstruction from incompletely lysed thrombus in individuals with a history of proximal (iliofemoral) DVT who have developed post thrombotic syndrome.
  - Initial imaging is duplex (CPT® 93970 bilateral study or CPT® 93971 unilateral study)
  - Either a CTV or MRV Abdomen and Pelvis (CPT® 74174) or (CPT® 74185 and 72198) OR CTV Pelvis (CPT® 72191) or MRV Pelvis (CPT® 72198), or venography for treatment planning purposes
- Imaging for post-thrombotic syndrome is only considered medically necessary for **either**:
  - Signs and symptoms suggestive of a new acute DVT
  - Pre-operative planning for iliac vein/stenting for suspected iliac vein stenosis or occlusion

Background and Supporting Information

- Chronic deep venous thrombosis is defined as an acute DVT that is greater than 14 days old.
- Incompletely lysed DVT can cause luminal narrowing of the vein restricting venous outflow leading to stenosis or occlusion and /or can lead to valve dysfunction resulting in reflux of venous blood retrograde towards gravity. Both pathologies ultimately lead to chronic edema which can cause chronic pain and venous stasis disease.
  - The mainstay of treatment for chronic deep venous thrombosis is compression stockings.
  - Selected individuals may be a candidate for iliac vein angioplasty/stenting.

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Post-thrombotic Syndrome (PVD-13.2)

Criteria

- Imaging for post-thrombotic syndrome is considered medically necessary when:
  - There are signs and symptoms suggestive of a new acute DVT.
  - For pre-operative planning for iliac vein/stenting in the setting of known iliac venous obstruction in those with a history of a proximal (iliofemoral) DVT
- Imaging for post-thrombotic syndrome is considered not medically necessary for chronic swelling that has not changed in severity or character.

May-Thurner Syndrome (PVD-13.3)

Criteria

- CTV or MRV Abdomen and Pelvis (CPT® 74174, or 74185 and 72198) OR CTV Pelvis or MRV Pelvis (CPT® 72191 or 72198) is considered medically necessary in individuals with a history of **one** of the following:
  - Left lower extremity iliac DVT
  - Persistent left lower extremity edema OR varicose veins OR venous stasis ulcer despite surgical treatment (ablation, stripping) of superficial venous disease in that extremity
  - Persistent left lower extremity edema OR varicose vein OR venous stasis ulcer in the absence of saphenous vein reflux.
- Imaging and/or prophylactic treatment of May-Thurner syndrome, in the absence of acute or chronic DVT **or** chronic left lower extremity edema and its sequelae such as varicose veins or venous stasis ulcers, is **not** considered medically necessary
- For surveillance of previously placed iliac venous stents see **Post Iliac Vein Stenting/angioplasty (PVD-17.1)**

Background and Supporting Information

In approximately 25% of people, the right iliac artery overlies the left iliac vein over the fifth lumbar vertebrae and its pulsations can compress the vein increasing the risk of DVT in the left extremity. Treatment is with iliac vein angioplasty/stenting.

Pelvic Congestion Syndrome (PVD-13.4)

Criteria

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- Signs and symptoms of pelvic congestion syndrome include:
  - Chronic pelvic pain OR post-coital discomfort >6 months.
  - Associated symptoms can include the presence of labial varicosities or heavy menstrual periods.
- Initial imaging is via transvaginal or pelvic ultrasound to exclude other pathologies of chronic pelvic pain.
- CTV or MRV Abdomen and Pelvis (CPT® 74174, or 74185 and 72198) is considered medically necessary if initial ultrasound is inconclusive or non-diagnostic.

Evidence Discussion

Chronic lower extremity swelling may result from underlying venous pathology, including chronic deep venous thrombosis (DVT), May–Thurner syndrome (iliac vein compression), post-thrombotic syndrome (PTS), and pelvic congestion syndrome. May–Thurner syndrome is characterized by extrinsic compression of the left common iliac vein by the right common iliac artery, leading to venous outflow obstruction, venous stasis, and predisposition to iliofemoral DVT and chronic venous insufficiency (Harbin & Lutsey, 2020).

In patients presenting with unilateral lower extremity edema—particularly isolated left leg swelling or asymmetry (left greater than right) venous duplex ultrasound (DUS) of the lower extremity is recommended as the first-line diagnostic modality to evaluate for DVT.

If femoral or proximal DVT is identified, further evaluation with pelvic venous duplex ultrasound should be performed to assess for extension into the iliac veins or inferior vena cava (IVC), or for extrinsic compression such as mass effect or iliac vein compression (Li et al., 2023).

However, duplex ultrasound has recognized limitations in evaluating iliac vein thrombosis due to anatomic depth and overlying structures; therefore, cross-sectional imaging may be required when suspicion persists (Jain et al., 2018).

Computed tomography venography (CTV) or magnetic resonance venography (MRV) of the abdomen and pelvis is indicated in acute iliofemoral DVT identified on ultrasound, for treatment planning and assessment of proximal extent, suspected iliocaval thrombosis or stenosis when ultrasound is non-diagnostic or limited (e.g., bowel gas, body habitus) and patients with chronic unilateral edema, prior left iliac DVT, or signs of venous stasis disease without superficial venous insufficiency, to evaluate for occult iliac vein compression (e.g., May–Thurner syndrome). Cross-sectional imaging plays a key role in detecting iliocaval obstruction and guiding endovascular intervention planning in both acute and chronic venous disease (Li et al., 2023).

Additionally, in patients with recurrent symptoms following iliocaval stenting, CTV or MRV is appropriate to evaluate for in-stent restenosis or thrombosis.

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Post-thrombotic syndrome is a chronic complication following DVT, occurring in approximately 20–50% of patients with proximal DVT, and is characterized by persistent venous insufficiency, limb swelling, pain, skin changes, and ulceration. The pathophysiology involves venous obstruction and/or valvular incompetence following thrombus resolution (Corvino et al., 2025).

Management is primarily conservative, consisting of compression therapy and symptom control. Advanced imaging is generally not required unless there is concern for new or recurrent iliofemoral DVT or when intervention is being considered for significant iliac vein obstruction.

Pelvic congestion syndrome (PCS) is a potential cause of chronic pelvic pain, dyspareunia, or post-coital discomfort, resulting from pelvic venous insufficiency and varicosities. Initial imaging consists of transabdominal or transvaginal ultrasound to exclude other causes of pelvic pain, while advanced imaging (CTV or MRV) is indicated when ultrasound is inconclusive or for procedural planning. MRI, CT, and venography can further characterize pelvic varices and underlying venous obstruction, including associated conditions such as iliac vein compression (Balabuszek, Toborek, & Pietura, 2022).

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Chronic Limb Swelling Due to Venous Insufficiency/Venous Stasis Changes/ Varicose Veins (PVD-14)

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Venous Reflux (PVD-14.2)

Criteria

- A venous valvular insufficiency study (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is considered medically necessary to diagnose presence of reflux in the greater saphenous vein as well as the size of the refluxing vein.
- A duplex ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is considered medically necessary within six months before treatment with intervention to demonstrate the presence of pathologic reflux (>500ms) within the greater and lesser saphenous veins and document vein size.
- A post-ablation venous ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is considered medically necessary within seven days post-procedure.
  - If thrombus is noted within the saphenofemoral junction, repeat imaging can be performed within seven days to assess for propagation into the deep system.
- Post-procedure assessment by imaging techniques is not considered medically necessary to confirm efficacy or outcome of the procedure.

Evidence Discussion

Venous insufficiency-– General information

- Venous insufficiency is characterized by failure of the venous blood to flow in its normal path of flow and instead refluxes backwards by the force of gravity usually secondary to malfunction of the venous valves.
- Risk factors include previous DVT, obesity, hereditary, and environmental factors such as prolonged standing on a hard surface.
- Venous insufficiency loosely includes the diagnosis of venous reflux, varicose veins, venous stasis ulcers, and spider/reticular veins.
- Diagnosis is made with a venous valvular insufficiency study which documents the presence of reflux (>500ms) in the greater saphenous vein as well as the size of the refluxing vein (3-15mm).

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- Treatment of superficial venous reflux is amenable to intervention in selected individuals who are symptomatic and have failed conservative therapy.
- Ultrasound mapping or monitoring techniques are considered medically necessary only to initially determine the extent and configuration of symptomatic varicosities or valvular insufficiency.

Venous reflux

- Symptoms of venous reflux include chronic edema, pain, and venous stasis ulcerations. Symptoms of venous reflux can be ameliorated with compression therapy with graded compression stockings, elevation, avoidance of prolonged standing and weight loss. Venous reflux can be seen in both the deep and superficial venous systems. Reflux within the deep system is not amenable to intervention.
- Treatment of deep venous reflux is via active compression with compression socks, pneumatic pumps, or specialized dressings such as Unna boots.
- Treatment of symptomatic superficial venous reflux is via endovenous laser or radiofrequency ablation of the greater or lesser saphenous vein resulting in closure of the vein allowing for venous blood to be rerouted to the deep venous system.
- Treatment of symptomatic superficial venous reflux can also be treated via saphenous vein ligation and stripping which has fallen out of favor but can be performed for a tortuous or enlarged (>15mm) great saphenous or small saphenous vein. One complication of endovenous ablation is deep venous thrombosis.

Varicose Veins

- If the varicosities remain symptomatic despite conservative therapy, varicose veins are treated with sclerotherapy or phlebectomy generally on the basis of size.
- Varicose veins are defined as enlarged, tortuous veins visible under the skin. Symptoms associated with varicose veins include aching and heaviness of the legs and pain/discomfort over the varicosities. Varicose veins can exist both in the absence and presence of venous reflux.
- Treatment involves conservative therapy such as compression stockings, avoidance of prolonged standing, intermittent elevation, weight loss (if applicable) and exercise which relieves the distention of the varicose veins ameliorating the symptoms.

Spider veins/reticular veins

- Spider veins are formed by the dilation of a cluster of blood vessels within the dermis – generally <3mm in diameter. Diagnosis is via physical examination. Spider veins are usually asymptomatic but can cause aching, burning, and tenderness in the area overlying the abnormal veins. Spider veins can exist in the absence or presence of venous reflux. The presence of spider veins should not be an indication for treatment of venous reflux.
- Treatment of spider veins is generally cosmetic except in certain cases and can be treated with sclerotherapy.

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General Guidelines (SP-1.0)

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Criteria

- These Spine Imaging Guidelines are intended for further investigation of spinal conditions or concerns. Imaging guidelines for non-spinal, musculoskeletal (MSK) conditions or concerns (e.g., shoulder, elbow, wrist, hand, arm, pelvis, hip, knee, ankle, leg, foot) are located in **Musculoskeletal Imaging Guidelines**.
- Before advanced diagnostic imaging can be considered, there must be an in-person clinical evaluation as well as a clinical re-evaluation after a trial of failed conservative therapy. Conservative therapy is not required in the presence of a Red Flag Indication or if otherwise stated in the Spine Imaging Guidelines.
- An in-person clinical evaluation performed after the current episode of symptoms started or changed is required and must include relevant:
  - history
  - physical examination
  - neurological examination documenting **AT LEAST ONE** of the following:
    - motor strength testing
    - sensory examination (e.g., documentation of the specific dermatomal distribution of altered sensation)
    - deep tendon reflex examination
    - nerve root tension signs, when applicable (e.g., straight leg raise test, slump test, femoral nerve tension test)
- For those spinal conditions/disorders for which the Spine Imaging Guidelines require a plain x-ray of the spine prior to consideration of an advanced imaging study, the plain x-ray must be performed after the current episode of symptoms started or changed and results need to be available to the requesting provider of the advanced imaging study (see: **Anatomic Guidelines [SP-2.1]**).
- Clinical re-evaluation is required prior to consideration of advanced diagnostic imaging to document failure of clinical improvement following a trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed as follows:
  - A documented trial of conservative care lasting at least six weeks in duration
  - A clinical re-evaluation or documentation of other meaningful contact (e.g., email, telephone, video consult) with the provider's office following the initial evaluation
  - Details will be in the specific criteria sections throughout this publication regarding when conservative treatment is required.

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- Any bowel/bladder abnormalities or emergent or urgent indications should be documented at the time of the initial clinical evaluation and clinical re-evaluation.
- Altered sensation to pressure, pain, and temperature should be documented by the specific anatomic distribution (e.g., dermatomal, stocking/glove or mixed distribution).
- Motor deficits (weakness) should be defined by the specific myotomal distribution (e.g., weakness of toe flexion/extension, knee flexion/extension, ankle dorsi/plantar flexion, wrist dorsi/palmar flexion) and gradation of muscle testing should be documented as follows:

Grading of Manual Muscle Testing	
0	No muscle activation
1	Trace muscle activation, such as a twitch, without achieving full range of motion
2	Muscle activation with gravity eliminated, achieving full range of motion
3	Muscle activation against gravity, full range of motion
4	Muscle activation against some resistance, full range of motion
5	Muscle activation against examiner's full resistance, full range of motion

- Pathological reflexes (e.g., Hoffmann's, Babinski, and Chaddock sign) should be reported as positive or negative.
- Asymmetric reflexes and reflex examination should be documented as follows:

Grading of Reflex Testing	
0	No response
1+	A slight but definitely present response
2+	A brisk response
3+	A very brisk response without clonus
4+	A tap elicits a repeating reflex (clonus)

- Advanced diagnostic imaging is often urgently indicated and may be necessary if serious underlying spinal and/or non-spinal disease is suggested by the presence

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of certain individual factors referred to as “Red Flags.” See: **Red Flag Indications (SP-1.2)**.

- Spinal specialist evaluation can be helpful in determining the need for advanced diagnostic imaging, especially for individuals following spinal surgery.
- The need for repeat advanced diagnostic imaging should be carefully considered and may not be medically necessary if prior advanced diagnostic imaging has been performed. In cases of chronic low back pain with no disease progression, repeat imaging is considered not medically necessary. Requests for simultaneous, similar studies such as spinal MRI and CT need to be documented as required for pre-operative surgical planning. These studies may be helpful in the evaluation of complex failed spinal fusion cases or needed for pre-operative surgical planning when the determination of both soft tissue and bony anatomy is required.
- Serial advanced imaging, whether CT or MRI, for surveillance of healing or recovery from spinal disease is not supported by the currently available scientific evidence-based medicine for the majority of spinal disorders.
  - Requests for repeat imaging may be considered on a case-by-case basis (e.g., concern for delayed union or non-union of spinal fracture, pseudoarthrosis of fusion, etc.).
- Advanced imaging is considered not medically necessary for resolved or improving spinal pain and/or radiculopathy.
- Advanced diagnostic imaging has not been shown to be of value in individuals with stable, longstanding spinal pain without neurological features or without clinically significant or relevant changes in symptoms or physical examination findings.
- Anatomic regions of the spine/pelvis that are included in the following MRI and CT advanced diagnostic imaging studies:
  - Cervical spine: from the skull base/foramen magnum through T1
  - Thoracic spine: from C7 through L1
  - Lumbar spine: from T12 through mid-sacrum
  - Pelvis: includes hips, sacroiliac joints, sacrum, coccyx
- CT or MRI of the cervical and thoracic spine will image the entire spinal cord since the end of the spinal cord or conus medullaris usually ends at L1 in adults. Therefore, lumbar spine imaging is not needed when the goal is to image only the spinal cord unless there is known or suspected low lying conus medullaris (e.g., tethered cord).

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence;

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education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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General Considerations (SP-1.1)

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- See: **General Guidelines (SP-1.0)**

Background and Supporting Information

Straight leg raise test (also known as the Lasegue's test) – With the individual in the supine position, the hip medially rotated and adducted, and the knee extended, the examiner flexes the hip until the individual complains of pain or tightness in the back or back of the leg. If the pain is primarily back pain, it is less specific whereas if the pain is primarily in the leg, it is more likely nerve root irritation/radiculopathy. Disc herniation or pathology causing pressure between the two extremes are more likely to cause pain in both areas. The examiner then slowly and carefully drops the leg back (extends it) slightly until the individual feels no pain or tightness. The individual is then asked to flex the neck so the chin is on the chest, or the examiner may dorsiflex the individual's foot, or both actions may be done simultaneously. Both maneuvers are considered to be provocative tests for neurological tissue.

Slump test – The individual is seated on the edge of the examination table with the legs supported, the hips in neutral position, and the hands behind the back. The examination is performed in sequential steps. First, the individual is asked to "slump" the back into thoracic and lumbar flexion. The examiner maintains the individual's chin in neutral position to prevent neck and head flexion. The examiner then uses one arm to apply overpressure across the shoulders to maintain flexion of the thoracic and lumbar spines. While this position is held, the individual is asked to actively flex the cervical spine and head as far as possible (i.e., chin to chest). The examiner then applies overpressure to maintain flexion of all three parts of the spine (cervical, thoracic, and lumbar) using the hand of the same arm to maintain overpressure in the cervical spine. With the other hand, the examiner then holds the individual's foot in maximum dorsiflexion. While the examiner holds these positions, the individual is asked to actively straighten the knee as much as possible. The test is repeated with the other leg and then with both legs at the same time. If the individual is unable to fully extend the knee because of pain, the examiner releases the overpressure to the cervical spine and the individual actively extends the neck. If the knee extends further, the symptoms decrease with neck extension, or the positioning of the individual increases the individual's symptoms, then the test is considered positive.

Femoral nerve tension test (also known as the prone knee bending test) – The individual lies prone while the examiner passively flexes the knee as far as possible so that the individual's heel rests against the buttock. At the same time, the examiner should ensure that the individual's hip is not rotated. If the examiner is unable to flex the

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individual's knee past 90 degrees because of a pathological condition in the hip, the test may be performed by passive extension of the hip while the knee is flexed as much as possible. The flexed knee position should be maintained for 45 to 60 seconds. Unilateral neurological pain in the anterior thigh may indicate an L2-4 nerve root distribution. Pain in the anterior thigh indicates tight quadriceps muscles or stretching of the femoral nerve.

Hoffmann's sign – The examiner holds the individual's middle finger and briskly flicks the distal phalanx. A positive test is noted if the interphalangeal joint of the thumb of the same hand flexes.

Babinski's sign – The examiner runs a sharp instrument along the plantar surface of the foot from the calcaneus along the lateral border to the forefoot. A positive test occurs with extension of the great toe with flexion and splaying of the other toes. A negative test occurs with no movement of the toes at all or uniform bunching up of the toes.

Chaddock sign – The examiner strokes the lateral malleolus. A positive test occurs with extension of the great toe.

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Red Flag Indications (SP-1.2)

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Criteria

Red Flag Indications are intended to represent the potential for life or limb threatening conditions. Red Flag Indications are clinical situations in which localized spine pain and associated neurological features are likely to reflect serious underlying spinal and/or non-spinal disease and warrant exception to the requirement for documented failure of six weeks of provider-directed treatment. Advanced diagnostic imaging of the symptomatic level is considered medically necessary **and/or** work-up for a non-spinal source of spine pain for Red Flag Indications.

- Red Flag Indications include:
  - motor weakness
  - aortic aneurysm or dissection
  - cancer
  - cauda equina syndrome
  - fracture
  - infection
  - severe radicular pain

Motor Weakness

(See: Grading of Manual Muscle Testing and Reflex Testing in **General Guidelines [SP-1.0]**)

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History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
Clinical presentation including one or more of the following: • new onset motor weakness of grade 3/5 or less of specified muscle(s) • new onset foot drop • new onset bilateral lower extremity weakness • progressive objective motor/sensory/deep tendon reflex deficits on clinical re-evaluation	MRI of the relevant spinal level* without contrast **OR** MRI of the relevant spinal level* without and with contrast **The SI joint and sacrum are relevant levels of the spine and are captured with pelvic imaging.*

Aortic Aneurysm or Dissection

History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
• new onset of back and/or abdominal pain in an individual with a known AAA; ***or*** • Acute dissection is suspected.	Spine imaging is considered not medically necessary. See: **Aortic Disorders, Renal Vascular Disorders and Visceral Artery Aneurysms (PVD-6)** in the Peripheral Vascular Disease Imaging Guidelines.

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Cancer

History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
There is clinical suspicion of spinal malignancy **AND ONE** or more of the following: • night pain • uncontrolled or unintended weight loss • pain unrelieved by change in position • age >70 years • severe or worsening spinal pain	**ONE** of the following: • MRI of the relevant spinal level* without contrast **OR** • MRI of the relevant spinal level* without and with contrast **OR** • CT of the relevant spinal level* without contrast **OR** • CT Myelogram of the relevant spinal level* **The SI joint and sacrum are relevant levels of the spine and are captured with pelvic imaging*.
Individual with a known history of cancer with back pain raising suspicion of spinal malignancy	See: **Spinal/Vertebral Metastases (ONC-31.6)** in the Oncology Imaging Guidelines

Cauda Equina Syndrome

History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
Clinical presentation including one or more of the following: • acute onset of bilateral sciatica • perineal sensory loss (“saddle anesthesia”) • decreased anal sphincter tone • new onset bowel/bladder incontinence • otherwise unexplained acute urinary retention	MRI Lumbar Spine without contrast (CPT® 72148) **OR** MRI Lumbar Spine without and with contrast (CPT® 72158)

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Fracture

History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
• Clinical suspicion of a pathological spinal fracture ◦ Advanced imaging is considered medically necessary after x-ray; no conservative treatment is needed.	See: **Spinal Compression Fractures (SP-11.1)** for appropriate imaging studies
• Clinical suspicion of a spinal fracture after trauma ◦ Advanced imaging is considered medically necessary after x-ray; no conservative treatment is needed.	See: **Neck (Cervical Spine) Trauma (SP-3.2)**, **Upper Back (Thoracic Spine) Trauma (SP-4.2)**, or **Low Back (Lumbar Spine) Trauma (SP-6.2)** for appropriate imaging studies
• Clinical suspicion of a spinal fracture related to ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis (DISH) ◦ Advanced imaging is considered medically necessary ***without*** x-ray or conservative treatment.	See: **Neck (Cervical Spine) Trauma (SP-3.2)**, **Upper Back (Thoracic Spine) Trauma (SP-4.2)**, **Low Back (Lumbar Spine) Trauma (SP-6.2)**, or **Inflammatory Spondylitis (SP-10.2)** for appropriate imaging studies

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Infection

History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
There is a clinical suspicion of spinal infection (e.g., disc space infection, epidural abscess, or spinal osteomyelitis) and one or more of the following: • fever • history of IV drug use • recent bacterial infection (UTIs, pyelonephritis, pneumonia) • recent spinal intervention (e.g., surgery, pain injection, or stimulator implantation) • immunocompromised states • long term use of systemic glucocorticoids • organ transplant recipient taking anti-rejection medication • diabetes mellitus • HIV/AIDS • chronic dialysis • immunosuppressant therapy • neoplastic involvement of the spine • laboratory values indicative of infection (e.g., elevated WBC, ESR, CRP, positive cultures) • decubitus ulcer or wound overlying spine • abnormal x-ray or CT suspicious for infection	**ONE** of the following: • MRI of the relevant spinal level* without and with contrast **OR** • MRI of the relevant spinal level* without contrast **OR** • CT of the relevant spinal level* without IV contrast **OR** • CT of the relevant spinal level* with IV contrast **OR** • FDG-PET/CT whole-body when x-ray or CT are abnormal **AND** when MRI cannot be performed or is inconclusive **OR** • 3-phase bone scan complete spine **OR** • Bone SPECT or Bone SPECT/CT **OR** • Gallium scan whole body or limited spine **OR** • Gallium SPECT or SPECT/CT **OR** • Gallium scan whole body or limited spine** with SPECT or SPECT/CT **The SI joint and sacrum are relevant levels of the spine and are captured with pelvic imaging.* ***Any bone scan can be combined with any Gallium scan*

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History, Symptoms or Physical Exam Findings (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
There is a clinical suspicion of spinal infection (e.g., disc space infection, epidural abscess, or spinal osteomyelitis) **and** one or more of the following: • new neurologic deficit on physical examination • cauda equina syndrome	**ONE** of the following: • MRI of the relevant spinal level* without and with contrast **OR** • MRI of the relevant spinal level* without contrast **OR** • CT of the relevant spine level* without IV contrast **OR** • CT of the relevant spinal level* with IV contrast **The SI joint and sacrum are relevant levels of the spine and are captured with pelvic imaging.*

Severe Radicular Pain

All the following must be present (In-person clinical evaluation for the current episode of the condition required)	Advanced Diagnostic Imaging
• Severe radicular pain in a specified spinal nerve root distribution (minimum 9/10 on the Visual Analog Scale (VAS); **and** • Documented significant functional loss at work or at home; **and** • Severity of pain unresponsive to a minimum of seven (7) days of provider-directed treatment; **and** • Treatment plan includes **one** of the following: ◦ transforaminal epidural steroid injection (TFESI) at any level(s); or ◦ interlaminar epidural steroid injection (ILESI) at the cervical or thoracic levels; or ◦ urgent/emergent spinal surgery; or ◦ urgent/emergent referral to/consultation from a spine specialist (Interventional Pain physician or Spine Surgeon)	MRI of the relevant spinal level* without contrast **OR** MRI of the relevant spinal level* without and with contrast **The SI joint and sacrum are relevant levels of the spine and are captured with pelvic imaging.*

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Definitions (SP-1.3)

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Criteria

- **Radiculopathy**, for the purpose of this policy, is defined as the presence of pain resulting in significant functional limitations (i.e., diminished quality of life and impaired, age-appropriate activities of daily living), dysaesthesia(s) or paraesthesia(s) reported by the individual in a specified dermatomal distribution of an involved named spinal root(s) and **ONE or MORE** of the following:
  - Loss of strength of specific named muscle(s) or myotomal distribution(s) or demonstrated on detailed neurologic examination (within the prior 3 months), concordant with nerve root compression of the involved named spinal nerve root(s)
  - Altered sensation to light touch, pressure, pin prick or temperature demonstrated on a detailed neurologic examination (within the prior 3 months) in the sensory distribution concordant with nerve root compression of the involved named spinal nerve root(s)
  - Diminished, absent, or asymmetric reflex(es) on a detailed neurologic examination (within the prior 3 months) concordant with nerve root compression of the involved named spinal nerve root(s)
  - **Either** of the following:
    - A concordant radiologist's interpretation of an advanced diagnostic imaging study (MRI or CT) of the spine demonstrating compression of the involved named spinal nerve root(s) or foraminal stenosis at the concordant level(s) (performed within the prior 12 months)
    - Electrodiagnostic studies (EMG/NCVs) diagnostic of nerve root compression of the involved named spinal nerve root(s) (performed within the prior 12 months)
- **Radicular pain** is pain which radiates to the upper or lower extremity along the course of a spinal nerve root, typically resulting from compression, inflammation and/or injury to the nerve root.
- **Radiculitis** is defined, for the purpose of this policy, as radicular pain without objective neurological findings.

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Evidence Discussion (SP-1)

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Prior to advanced imaging, it is critical to perform a detailed history and physical examination in the evaluation of an individual for spinal pathology (Childress & Stuek, 2020; Mathieu et al., 2023; Chou et al., 2009). Features of the clinical history and physical examination not only help in the formulation of a differential diagnosis but also influence decisions about diagnostic imaging (Deyo, Rainville, & Kent, 1992). Also, as the more common findings on imaging studies are often nonspecific and non-diagnostic, clinical history and exam findings play a crucial role (Ciesla et al., 2011). These incidental findings may lead to unnecessary further diagnostic workup and additional negative downstream outcomes.

Multiple studies have shown most individuals with acute neck or back pain will improve with 6 weeks of conservative care (Hutchins et al., 2021; Childress & Becker, 2016; Shubha, Deyo, & Berger, 2012); however, conservative care would not be necessary for individuals with Red Flag Indications (Verhagen et al., 2016).

Risks associated with imaging include, but are not limited to, radiation exposure and contrast complications (Webster & Cifuentes, 2010; Lee et al., 2019). Studies have also linked the increase rate of imaging with the increase rate of surgery and also found early magnetic resonance imaging (MRI) had an eight-fold increased risk of surgery (Webster & Cifuentes, 2010; Watson & Yu, 2023). It should also be of note that routine repeat advanced imaging for many spinal conditions has been shown to have limited value (Panagopoulos et al., 2017; Ries et al., 2018; Linna et al., 2024).

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Imaging Techniques (SP-2)

Guideline

Anatomic Guidelines (SP-2.1)
MRI of the Spine (SP-2.2)
CT of the Spine (SP-2.3)
CT/Myelography (SP-2.4)
Imaging of Intervertebral Discs (SP-2.5)
Ultrasound of the Spinal Canal (SP-2.6)
Limitations of Spinal Imaging in Degenerative Disorders (SP-2.7)
Miscellaneous Spinal Lesions (SP-2.8)
MRA Spinal Canal (SP-2.9)
Spine PET/CT (SP-2.10)
Cone-beam CT (SP-2.11)
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Anatomic Guidelines (SP-2.1)

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Criteria

- Anatomic regions of the spine/pelvis that are included in the following MRI and CT advanced diagnostic imaging studies:
  - Cervical spine: from the skull base/foramen magnum through T1
  - Thoracic spine: from C7 through L1
  - Lumbar spine: from T12 through mid-sacrum
  - Pelvis: includes hips, sacroiliac joints, sacrum, coccyx
- CT or MRI Cervical and Thoracic Spine will image the entire spinal cord since the end of the spinal cord or conus medullaris usually ends at L1 in adults. Therefore, lumbar spine imaging is considered not medically necessary when the goal is to image only the spinal cord unless there is known or suspected low-lying conus medullaris (e.g., tethered cord).
- The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study for the following conditions:
  - See: **Spinal Compression Fractures (SP-11)**
  - See: **Lumbar Spine Spondylolysis/Spondylolisthesis (SP-8)**
  - See: **Inflammatory Spondylitis (SP-10.2)**
  - See: **Upper Back (Thoracic Spine) Pain without and with Neurological Features (Including Stenosis) (SP-4.1)**
  - See: **Neck (Cervical Spine) Trauma (SP-3.2)**
  - See: **Coccydynia without Neurological Features (SP-5.2)**
  - See: **Spinal Deformities (e.g., Scoliosis/Kyphosis) (SP-14)** and **Spinal Dysraphism (PEDSP-4)** in the Pediatric and Special Populations Spine Imaging Guidelines
  - See: **Sacro-Iliac (SI) Joint Pain, Inflammatory Spondylitis/Sacroiliitis and Fibromyalgia (SP-10)**
  - See: **Post-Operative Spinal Disorders (SP-15)**

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MRI of the Spine (SP-2.2)

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Criteria

- See: **Procedure Codes Associated with Spine Imaging**
- For MR Spectroscopy, all spine uses are considered not medically necessary.
  - See: **Imaging of Intervertebral Discs (SP-2.5)**
- MRI Spine is performed either without contrast, with contrast, *or* without and with contrast. A "with contrast" study alone is considered medically necessary only to complete a study begun without contrast. Contrast is generally considered not medically necessary for most disc and nerve root disorders, fractures, and degenerative disease.
- MRI Spine indications include:
  - Evaluation of disc disease, spinal cord and nerve root disorders, and most other spinal conditions including evaluation of congenital anomalies of the spine and spinal cord
  - Suspicion for or surveillance of known spine/spinal canal/spinal cord neoplastic disease
  - Suspicion, diagnosis of, or surveillance of spinal infections, multiple sclerosis, or other causes of myelitis, syringomyelia, cauda equina syndrome, or other "red flag" indications. See: **Red Flag Indications (SP-1.2)**.
  - Pre-operative evaluation to define abnormal or variant spinal anatomy that could influence the outcome of a potential surgical procedure. See: **Prior to Spine Surgery (SP-16.1)**.
  - Spinal imaging for individuals having undergone recent spinal surgery (e.g., laminectomy, discectomy, spinal decompression) when history and physical examination is suspicious for hematoma, post-surgical infection, or cerebrospinal fluid (CSF) leak

Positional MRI

- Positional MRI is also referred to as dynamic, weight-bearing, or kinetic MRI. Currently, there is inadequate scientific evidence to support the medical necessity of this study. As such, it should be considered not medically necessary.

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CT of the Spine (SP-2.3)

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Criteria

- See: **Procedure Codes Associated with Spine Imaging**
- CT Spine indications include:
  - Contraindication to MRI
    - CT (contrast as requested) is considered medically necessary when **ANY** of the following MRI contraindications are documented **AND** indications for the MRI are met:
      - implanted ferromagnetic materials
      - electronically, magnetically, or mechanically activated implanted devices that are not determined by the manufacturer as MRI compatible/conditional
  - CT without contrast or CT without and with contrast (even if MRI has already been performed) for any spinal trauma/fractures, especially spinal trauma/fractures that could result in spinal instability and spinal cord/spinal nerve compression
  - CT without contrast or CT without and with contrast (even if MRI has already been performed) for spinal neoplastic disease – primary or metastatic
  - CT without contrast (even if MRI has already been performed) in conjunction with discography (see: **Imaging of Intervertebral Discs [SP-2.5]**)
  - CT without contrast, or CT without and with contrast (even if MRI has already been performed) for pre-operative evaluation to define abnormal or variant bony spinal anatomy that could influence the outcome of a potential surgical procedure (see: **Prior to Spine Surgery [SP-16.1]**)
  - CT without contrast or CT without and with contrast (even if MRI has already been performed) to assess spinal fusions when pseudoarthrosis is suspected (not to be used for routine post-operative assessment where x-rays are sufficient and/or there are no concordant clinical signs or symptoms)
  - CT without contrast or CT without and with contrast (even if MRI has already been performed) for congenital, developmental, or acquired spinal deformity (see: **Spinal Deformities [e.g., Scoliosis/Kyphosis] [SP-14]**)
  - CT Lumbar without contrast (CPT® 72131) or CT Lumbar without and with contrast (CPT® 72133) for spondylolysis when routine x-rays are negative and/or MRI is equivocal, indeterminate, or non-diagnostic (see: **Lumbar Spine Spondylolysis/ Spondylolisthesis [SP-8]**)
  - CT without contrast or CT without and with contrast to evaluate calcified lesions (e.g., osteophytes, ossification of the posterior longitudinal ligament [OPLL])

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CT/Myelography (SP-2.4)

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Criteria

- See: **Procedure Codes Associated with Spine Imaging**
- CT/Myelography is generally considered not medically necessary as an initial study when a diagnostic quality MRI has been obtained.
- CT/Myelography indications include:
  - To clarify equivocal, indeterminate, or non-diagnostic MRI findings or to further evaluate the significance of multiple spinal abnormalities
  - When an MRI is contraindicated
  - Pre-operative planning for spine surgery (e.g., multilevel spinal stenosis or when a previous MRI is insufficient, equivocal, indeterminate, or non-diagnostic) (see: **Prior to Spine Surgery (SP-16.1)**)
  - Evaluation after previous spinal surgery when an MRI without and with contrast is contraindicated or MRI results are equivocal, indeterminate, or non-diagnostic
  - The guidelines allow for the approval of the post-myelogram CT (i.e., CPT® 72126, CPT® 72129, and CPT® 72132) only and not any other myelogram-related procedure codes (i.e., CPT® 72265 or CPT® 62284).

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Imaging of Intervertebral Discs (SP-2.5)

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Criteria

Post-lumbar Discography CT

- These guidelines allow for the post-lumbar discography CT procedure codes only and do not include any other discography-related procedure codes. A post-lumbar discography CT is considered medically necessary when **BOTH** of the following apply:
  - A CT Lumbar Spine without contrast (CPT® 72131) is considered medically necessary if verified to be performed as a post-discography CT.
  - A post-discography CT is requested and the discography has already been approved.

Magnetic Resonance Spectroscopy

- Magnetic Resonance Spectroscopy (MRS) involves the analysis of the levels of certain chemicals in pre-selected voxels (small regions) on an MRI scan done at the same time.
  - MRS (CPT® 76390, 0609T, 0610T, 0611T, and 0612T) is considered not medically necessary for all spine imaging uses at this time.

Background and Supporting Information

- Provocative Discography/CT and MR Spectroscopy lumbar spine are procedures purported to diagnose (or rule-out) a discogenic “pain generator” (i.e., the source of non-specific axial spinal pain). These diagnostic studies, when reported as positive, are often used as an indication for spinal fusion in individuals with non-specific axial back pain.
- The following uses of discography are considered controversial:
  - To identify a symptomatic pseudoarthrosis in a failed spinal fusion
  - To identify which of two herniated discs seen on MRI is symptomatic when not determined clinically or otherwise
  - To confirm the discogenic nature of pain in an individual with an abnormal disc seen on MRI and to rule out pain from an adjacent disc level
  - To confirm the presumptive diagnosis of “internal disc disruption”
  - Discography of the cervical and/or thoracic spine
- The following uses of MR Spectroscopy lumbar spine are considered controversial:

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- To identify which of two herniated discs seen on MRI is symptomatic when not determined clinically or otherwise
- To confirm the discogenic nature of pain in an individual with an abnormal disc seen on MRI and to rule out pain from an adjacent disc level
- To confirm the presumptive diagnosis of “internal disc disruption”

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Ultrasound of the Spinal Canal (SP-2.6)

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Criteria

- Spinal canal ultrasound (CPT® 76800) describes the evaluation of the spinal cord (canal and contents) and is most often performed in newborns, infants, young children, and intraoperatively.
- CPT® 76800 describes evaluation of the entire spine and should not be reported multiple times for imaging of different areas of the spinal canal.
- CPT® 76998, rather than CPT® 76800, should be used to report intraoperative spinal canal ultrasound (ultrasonic guidance). Intraoperative use of spinal ultrasound (CPT® 76998) would not require prior authorization.

Indications for spinal canal ultrasound (CPT® 76800):

- This study is generally limited to infants, newborns, and young children because of incomplete ossification of the vertebral segments surrounding the spinal cord, including the assessment of CSF in the spinal canal and for image-guided lumbar puncture.
- When ossification of the vertebral segments is incomplete for evaluation of suspected or known tethered cord (see: **Tethered Cord [PEDSP-5]** in the Pediatric and Special Populations Spine Imaging Guidelines)
- Evaluation of suspected occult and non-occult spinal dysraphism (see: **Spinal Dysraphism [PEDSP-4]** in the Pediatric and Special Populations Spine Imaging Guidelines)
- Evaluation of spinal cord tumors, vascular malformations, and cases of birth-related trauma
- Contraindicated for use in the adult spine for the assessment of spinal pain, radiculopathy, facet inflammation, nerve root inflammation, disc herniation, and soft tissue conditions surrounding the adult spine other than for superficial masses

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Limitations of Spinal Imaging in Degenerative Disorders (SP-2.7)

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Criteria

- Non-specific axial spinal pain is ubiquitous. Advanced diagnostic imaging infrequently identifies the source of the spinal pain (pain generator).
- Incidental findings on MRI and CT, including bulging, protruding, extruding or herniated discs, are often non-concordant, asymptomatic and increase in incidence as the spine ages.
- In individuals with poorly defined clinical presentations, “abnormal” spinal advanced diagnostic imaging results are infrequently clinically concordant, significant, material, or substantive and may even lead to inappropriate treatment.
- Performing advanced spinal imaging based only on the presence of spinal degenerative findings identified on x-rays is considered not medically necessary in individuals who are either asymptomatic or present with non-specific axial spinal pain.

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Miscellaneous Spinal Lesions (SP-2.8)

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Criteria

Vertebral body hemangiomas

- Vertebral body hemangiomas are common and are generally benign and incidental findings on plain x-rays and advanced diagnostic imaging studies.
- If the appearance of a vertebral body hemangioma is typical on plain x-ray, further spinal advanced diagnostic imaging is considered not medically necessary, unless there are associated neurologic symptoms or signs on physical examination.
- If the appearance of a vertebral body hemangioma is atypical on plain x-ray, with or without neurological signs or symptoms on physical exam, MRI without contrast or MRI without and with contrast is considered medically necessary.
- Occasionally, MRI may be equivocal, indeterminate, or non-diagnostic, and CT without contrast of the spinal area is considered medically necessary to help clarify the diagnosis.
- No follow-up imaging is considered medically necessary once the diagnosis of a vertebral body hemangioma is established without neurological features.

Tarlov cysts

- Tarlov cysts are most often cystic dilatations of nerve root sleeves in the lumbar spine and sacrum.
- Controversy exists as to whether Tarlov cysts can result in neurologic signs and symptoms, but they can result in erosion of the adjacent bone.
- Usually Tarlov cysts are benign, incidental findings on advanced diagnostic imaging studies. Further evaluation of a known or suspected Tarlov cyst can be performed with an MRI Lumbar Spine without and with contrast study (CPT® 72158) or CT/ Myelography Lumbar Spine (CPT® 72132).

Other spinal lesions

- MRI without and with contrast or a CT without contrast is considered medically necessary if:
  - Other spinal lesions are seen on routine x-rays or a non-contrast MRI; ***and***
  - These additional advanced imaging studies are recommended by a spine specialist or radiologist to further characterize or diagnose the lesion; ***or***
  - Required for surgical planning.

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MRA Spinal Canal (SP-2.9)

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Criteria

- MR angiography (MRA) Spine (CPT® 72159) imaging is utilized infrequently.
- Cerebrospinal Fluid (CSF) flow studies using MRI are included in CPT® codes 70551, 70552, and 70553 and should not be coded or reported separately, (see **CSF Flow Imaging (HD-24.4)**)

Indications may include:

- Suspected spinal cord arteriovenous malformation (AVM) or arteriovenous fistula (AVF):
  - MRI Spine of the relevant spine region without and with contrast should be the initial imaging study.
  - If suspicion for a spinal AVM or AVF is high based upon the results of the MRI Spine, catheter angiography is recommended.
- Subarachnoid hemorrhage where no brain aneurysm has been previously identified
  - Catheter angiography should be performed and is the most definitive study to define possible spinal pathology resulting in a spinal canal subarachnoid hemorrhage.
  - See: **General Guidelines – CT and MR Angiography (CTV and MRV) (HD-1.5)** in the Head Imaging Guidelines
  - See: **Cerebral Aneurysms (HD-12.1)** in the Head Imaging Guidelines
- Pre-operative planning
  - MRA Spinal canal may be useful in identifying major intercostal feeder vessels to the spinal cord prior to surgical procedures that might interfere with this blood supply. However, catheter angiography is generally a more definitive study for this purpose.
- 3D Rendering (CPT® 76377 or CPT® 76376) is considered medically necessary with spinal angiography to define the presence, location, and anatomy of intraspinal vascular malformations.

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Spine PET/CT (SP-2.10)

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Criteria

- At the present time, there is controversy regarding spine PET/CT due to inadequate scientific evidence to support the medical necessity of PET/CT for the routine assessment of spinal disorders, other than for neoplastic disease.
- See: **Spinal/Vertebral Metastases (ONC-31.6)** in the Oncology Imaging Guidelines
- Spine PET/CT is considered not medically necessary.

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Cone-beam CT (SP-2.11)

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Criteria

- Cone-beam CT for imaging of the cervical spine is considered not medically necessary.

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3D Rendering (SP-2.12)

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- See: **3D Rendering (MS-3)** in the Musculoskeletal Imaging Guidelines

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Evidence Discussion (SP-2)

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- X-rays are first line imaging for suspected inflammatory spine disease (Czuczman et al., 2021), following trauma (Hassankhani et al., 2024), concerns of spinal deformities (Boas, 2007), or post-operative spinal disorders (Corona-Cedillo et al., 2021). Although x-rays may not confirm a definitive diagnosis, they provide information that can better direct advanced imaging modalities.
- MRI utilizes a magnetic field and radio waves with computer processing to produce detailed images which have excellent soft tissue characterization and is the primary modality for evaluating the spinal cord, intervertebral disc disease, and other soft tissue pathology of the spine (American College of Radiology [ACR], 2022a; Eldaya et al., 2024; Agarwal et al., 2020). Positional MRI (Weishaupt et al., 2000) and MR Spectroscopy (Jakoniuk et al., 2022) lack sufficient scientific evidence to support their routine clinical use (Weishaupt et al., 2000).
- CT provides high spatial resolution for evaluation of osseous structures and can depict fractures, alignment abnormalities, and bony encroachment on the spinal canal with greater sensitivity than radiography in trauma settings (Hassankhani et al., 2024). CT also demonstrates bone destruction, calcification, and structural changes associated with neoplastic or degenerative processes, though it is less effective than MRI for characterization of marrow and spinal cord pathology (Agarwal et al., 2020). In the evaluation of spinal trauma, multidetector CT has been shown to have high sensitivity and specificity for detecting clinically significant fractures, approaching near-complete detection in many studies (Hassankhani et al., 2024). However, CT has important limitations in assessing soft tissue, ligamentous injury, and intrinsic spinal cord abnormalities, which may reduce its diagnostic yield for non-osseous etiologies (Hassankhani et al., 2024; Agarwal et al., 2020).
- CT/Myelography provides indirect visualization of the thecal sack in the spinal canal. MRI is the primary advanced imaging for these indications as the cord, thecal sac, and spinal canal can be directly visualized. CT/Myelography may provide additional anatomic detail in select scenarios, such as evaluation of canal stenosis or clarification of findings seen on other imaging modalities (Agarwal et al., 2020). However, compared with MRI, CT/Myelography is limited in its ability to evaluate intrinsic spinal cord abnormalities and soft tissue pathology, and it involves an invasive intrathecal contrast technique (Hassankhani et al., 2024; Agarwal et al., 2020).
- Ultrasound can be used to visualize the spinal canal in young children before the posterior elements ossify. Ultrasound will not penetrate ossified bone (Rees et al., 2021).
- Magnetic resonance angiography (MRA) has limited indications in spine imaging. While there is limited evidence supporting its use in initial evaluation of spinal cord

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pathology, it may provide additional information in cases of suspected vascular abnormalities, such as identifying abnormal vessels associated with spinal vascular malformations or ischemia (Agarwal et al., 2020).

- There is inadequate scientific evidence to support PET/CT for the routine assessment of spinal disorders, other than for neoplastic disease.
- There is inadequate scientific evidence to support cone beam CT for the routine assessment of spinal disorders outside of the operative setting, which is outside the coverage of these guidelines.

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Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma (SP-3)

Guideline

Neck (Cervical Spine) Pain without and with Neurological Features (Including Stenosis) (SP-3.1)
Neck (Cervical Spine) Trauma (SP-3.2)
Evidence Discussion (SP-3)
References (SP-3)

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Neck (Cervical Spine) Pain without and with Neurological Features (Including Stenosis) (SP-3.1)

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Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**) • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**)

Advanced Diagnostic Imaging:	MRI Cervical Spine, without contrast (CPT® 72141)
Comments:	CT Cervical Spine without contrast (CPT® 72125) **OR** CT Myelography (CPT® 72126) is considered medically necessary when MRI is contraindicated.

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Neck (Cervical Spine) Trauma (SP-3.2)

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Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**) • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**) • Results of plain x-rays of the cervical spine performed after the current episode of symptoms started or changed need to be available to the requesting provider (not required for high-risk mechanisms as below**)

Advanced Diagnostic Imaging:	**MRI Cervical Spine without contrast (CPT® 72141) OR CT Cervical Spine without contrast (CPT® 72125)** **For individuals with ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis (DISH), both MRI of the entire spine (CPT® 72141, 72146, and/or 72148) AND CT of the entire spine (CPT® 72125, 72128, and/or 72131) are considered medically necessary.** **For individuals with ankylosing spondylitis or DISH, plain x-rays and a 6-week trial of provider-directed treatment and clinical re-evaluation are NOT required.**
Comments:	Plain x-rays **ARE** required for suspected fracture in **non-high** risk injuries. Plain x-rays and a 6-week trial of provider-directed treatment and clinical re-evaluation are **NOT** required for individuals with a high risk factor(s) for suspected cervical spine injury within the last 3 months (See below**).

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**High-risk factors of suspected cervical spine injury may include:

- long term use of systemic glucocorticoids
- history of prior low energy fractures
- history of low bone mineral density
- age ≥65 years
- head trauma and/or maxillofacial trauma
- pedestrian in a motor vehicle accident
- fall from elevation ≥3 feet/5 stairs
- diving accident
- head-on motor vehicle collision without/with airbag deployment
- rollover motor vehicle collision
- ejection from the vehicle in a motor vehicle collision
- high speed of the vehicle at the time of collision
- not wearing a seatbelt/shoulder harness in a motor vehicle collision
- minor direct/indirect trauma to the cervical spine/maxillofacial areas in individuals with ankylosing spondylitis or DISH

Background and Supporting Information

- Pain radiation patterns from the cervical spine area into the thoracic spine area do not necessarily justify the addition of thoracic spine advanced diagnostic imaging.
- Cervical radiculopathy is often confused with shoulder disorders, brachial plexopathy, peripheral nerve entrapment, and/or motor/sensory neuropathies. Electrodiagnostic testing (EMGs/NCVs) is generally used to confirm, not establish, a diagnosis of peripheral nerve entrapment and/or a motor/sensory neuropathy based upon history and physical examination findings. Electrodiagnostic testing is often considered when advanced imaging of the spine does not reveal neurocompressive pathology and/or after 6 weeks of unimproved symptoms of extremity pain, weakness, numbness, and/or tingling.
- Individuals with ankylosing spondylitis or DISH are at high risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriparesis/quadriplegia.

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Evidence Discussion (SP-3)

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X-rays provide critical information that cannot be obtained with advanced imaging modalities and remain central to providing optimal care for spine individuals (Eldaya et al., 2024; Matsumoto et al., 1998; Baker et al., 2020). Unnecessary CT scans increase individuals' radiation exposure (Baker et al., 2020); however, it is the initial imaging for individuals involved in trauma with a high-risk factor for cervical spine injury (Hassankhani et al., 2024). Additionally, for individuals with diffuse idiopathic skeletal hyperostosis (DISH) or ankylosing spondylitis with a history of low-energy trauma, whole spine MRI or CT imaging is mandatory due to the high prevalence of acute fractures and the low specificity for fracture detection on radiographs (Lantsman et al., 2020; Le et al., 2021). The American College of Radiology (ACR) Appropriateness Criteria for Cervical Neck Pain or Cervical Radiculopathy (revised 2018) indicates that in the absence of red flag symptoms, early advanced imaging may not be required as abnormal findings are not uncommon in asymptomatic individuals and correlate poorly with the presence of neck pain (Eldaya et al., 2024).

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Upper Back (Thoracic Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma (SP-4)

Guideline

Upper Back (Thoracic Spine) Pain without and with Neurological Features (Including Stenosis) (SP-4.1)
Upper Back (Thoracic Spine) Trauma (SP-4.2)
Evidence Discussion (SP-4)
References (SP-4)

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Upper Back (Thoracic Spine) Pain without and with Neurological Features (Including Stenosis) (SP-4.1)

SP.TS.0004.1.A
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Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**) • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**) • Plain x-rays are required for thoracic back pain with or without neurological features (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**)

Advanced Diagnostic Imaging:	**MRI Thoracic Spine without contrast (CPT® 72146)**
Comments:	A CT Thoracic spine without contrast (CPT® 72128) **OR** CT Myelography (CPT® 72129) is considered medically necessary when MRI is contraindicated.

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Upper Back (Thoracic Spine) Trauma (SP-4.2)

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Criteria

All the following are required prior to advanced imaging:
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**). • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**). • Conservative treatment and clinical re-evaluation are not required in high-risk individuals. ◦ High-risk individuals include those that have sustained an acute traumatic injury with midline thoracolumbar tenderness, high-energy injury mechanisms, or greater than 60 years of age. • **After above criteria are met:** MRI Thoracic Spine without contrast (CPT® 72146) OR CT Thoracic Spine without contrast (CPT® 72128)

Indication:	Advanced Imaging
Ankylosing Spondylitis (AS) or Diffuse Idiopathic Skeletal Hyperostosis (DISH)	• MRI of the entire spine (CPT® 72141, 72146, and/or 72148) **AND** • CT of the entire spine (CPT® 72125, 72128, and/or 72131) For individuals with AS or DISH, a 6-week trial of provider-directed treatment and clinical re-evaluation are **NOT** required.

Background and Supporting Information

• Thoracic radiculopathy presents with pain radiation from the thoracic spine around the trunk. At upper thoracic spine levels, the pain radiation is from the thoracic spine around the rib cage following the sensory distribution of an intercostal nerve.

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Evidence Discussion (SP-4)

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The precision in identifying thoracic spine diseases is dependent on a meticulous association with the individual's clinical examination and medical history because the usual observations from imaging studies are frequently ambiguous and non-conclusive (Linna et al., 2024).

Wood et al. (1995) demonstrated that asymptomatic individuals may exhibit positive findings on thoracic spine MRI at a rate as high as 70%. For individuals with atraumatic thoracic back pain, data from Linna et al. (2024) support initial conservative management followed by evaluation by a surgical specialist before ordering a thoracic spine MRI. Red flag indications, however, obviate the need for conservative care.

Regarding the value of x-rays, Goodwin et al. (2022) stated that plain films provide critical information that cannot be obtained with other imaging modalities, and they remain central to providing optimal care for spine individuals. When there is a history of blunt trauma and a high-risk factor for thoracic spine injury, however, CT imaging is appropriate for initial imaging (Inaba et al., 2015; Hassankhani et al., 2024).

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Low Back (Lumbar Spine) Pain/Coccydynia without Neurological Features (SP-5)

Guideline

Low Back (Lumbar Spine) Pain without Neurological Features (SP-5.1)
Coccydynia without Neurological Features (SP-5.2)
Evidence Discussion (SP-5)
References (SP-5)

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Low Back (Lumbar Spine) Pain without Neurological Features (SP-5.1)

SP.LB.0005.1.A
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Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**). • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**)

Advanced Diagnostic Imaging:	**MRI Lumbar Spine without contrast (CPT® 72148)**
Comments:	A CT Lumbar spine without contrast (CPT® 72131) **OR** CT Myelography (CPT® 72132) is considered medically necessary when MRI is contraindicated.

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Coccydynia without Neurological Features (SP-5.2)

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Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**). • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**) • Plain x-rays of the sacrum/coccyx are negative for fracture.

Advanced Diagnostic Imaging:	**MRI Pelvis without contrast (CPT® 72195)**
Comments:	A CT Pelvis without contrast (CPT® 72192) when MRI is contraindicated

Background and Supporting Information

Coccydynia is often reported by individuals as “tailbone” pain that is usually idiopathic or post-traumatic and generally follows a benign course.

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Evidence Discussion (SP-5)

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Acute low back pain is usually a self-limited condition and improves with conservative treatment in 6 weeks. The American College of Radiology (ACR) Appropriateness Criteria for low back pain (revised 2021) states that imaging may be considered in those individuals who have had up to 6 weeks of medical management and physical therapy that resulted in little or no improvement in their back pain (Hutchins et al., 2021).

A meta-analysis by Chou et al. (2009) found no clinically significant difference in individual outcomes between those who had immediate lumbar imaging versus usual care. It should also be noted that there are risks associated with imaging including but not limited to radiation exposure and contrast complications (Shubha, Deyo, & Berger, 2012). Studies have also linked the increase rate of imaging with the increase rate of surgery and also found early magnetic resonance imaging (MRI) had an eight-fold increased risk of surgery (Shubha, Deyo, & Berger, 2012; Webster & Cifuentes, 2010).

Health Equity Consideration - Low Back Pain

Low back pain (LBP) is defined by the World Health Organization as the pain between the lower edge of the ribs and the buttocks and is considered acute if it happens suddenly or chronic if it lasts more than 3 months (WHO). In the Global Burden of Diseases, Injuries, and Risk Factors study (2017), over the 28-year period studied, LBP was one of the three leading chronic non-communicable diseases (GBD 2017). There has been exploration of a biopsychosocial paradigm of pain for chronic LBP, which considers influences including psychological, social and environmental factors (Aroke et al. 2020).

Social factors were associated with higher rates of often avoidable/unnecessary utilization outcomes such as Emergency Department visits and hospitalizations, imaging, and associated with lower preventive utilization outcomes, such as PT visits (Pak et al. 2024). In a study (Pak, 2024) social risk factors such as food insecurity and housing instability have shown to have detrimental effects on health, health care outcomes and heath disparities. Income, geographic location, and educational level were identified as contributing to LBP treatment disparities, with increased risk of receiving non-guideline concordant care, including opioid and MRI prescriptions, before conservative treatments were prescribed (Mathieu et al. 2024). Better understanding is needed to address the needs and expectations of patients suffering from LBP and how their individual characteristics may affect their access and utilization of healthcare services.

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Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) With or Without Low Back (Lumbar Spine) Pain (SP-6)

Guideline

Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) with or without Low Back (Lumbar Spine) Pain (SP-6.1)
Low Back (Lumbar Spine) Trauma (SP-6.2)
Evidence Discussion (SP-6)
References (SP-6)

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Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) with or without Low Back (Lumbar Spine) Pain (SP-6.1)

SP.LE.0006.1.A
v1.0.2027

Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6 week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**). • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**).

Advanced Diagnostic Imaging:	**MRI Lumbar Spine without contrast (CPT® 72148)**
Comments:	A CT Lumbar spine without contrast (CPT® 72131) **OR** CT Myelography (CPT® 72132) is considered medically necessary when MRI is contraindicated. See also: **Lumbar Spinal Stenosis (SP-9.1)**

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Low Back (Lumbar Spine) Trauma (SP-6.2)

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Criteria

***All* the following are required prior to advanced imaging:**
• An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation (see also: **General Guidelines (SP-1.0)**). • A documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed (unless presence of a red flag as defined in **Red Flag Indications (SP-1.2)**). • Clinical re-evaluation after treatment period (may consist of an in-person evaluation or other meaningful contact) (see also: **General Guidelines (SP-1.0)**). • Conservative treatment and clinical re-evaluation are not required in high-risk individuals. ◦ High-risk individuals include those that have sustained an acute traumatic injury with midline thoracolumbar tenderness, high-energy injury mechanisms, or greater than 60 years of age. • **After above criteria are met:** MRI Lumbar Spine without contrast (CPT® 72148) **OR** CT Lumbar Spine without contrast (CPT® 72131)

Indication:	Advanced Diagnostic Imaging
Ankylosing Spondylitis (AS) or Diffuse Idiopathic Skeletal Hyperostosis (DISH)	• MRI of the entire spine (CPT® 72141, 72146, and/or 72148) **AND** • CT of the entire spine (CPT® 72125, 72128, and/or 72131) For individuals with AS or DISH, a 6-week trial of provider-directed treatment and clinical re-evaluation are **NOT** required.

• For definitions of radiculopathy, radiculitis, and radicular pain, see **Definitions (SP-1.3)**.

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- For Sciatic Neuropathy, Femoral Neuropathy, Peroneal Neuropathy and Meralgia Paresthetica, see **Focal Neuropathy (PN-2)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines.
- For Lumbar and/or Lumbosacral Plexopathy, see **Lumbar and Lumbosacral Plexus (PN-5)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.
- Advanced imaging of the hip or pelvis is not generally required in the evaluation of apparent lumbar radiculopathy unless a separate recognized indication for such studies is documented. See: **Hip (MS-24)** in the Musculoskeletal Imaging Guidelines.

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Evidence Discussion (SP-6)

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Acute low back pain is usually a self-limited condition and improves with conservative treatment in 6 weeks. The American College of Radiology (ACR) Appropriateness Criteria® for low back pain (revised 2021) states that imaging may be considered in those individuals who have had up to 6 weeks of medical management and physical therapy that resulted in little or no improvement in their back pain (Hutchins et al., 2021).

A meta-analysis by Chou et al. found no clinically significant difference in individual outcomes between those who had immediate lumbar imaging versus usual care (Chou et al., 2009). It should also be noted that there are risks associated with imaging including but not limited to radiation exposure and contrast complications (Shubha, Deyo, & Berger, 2012). Studies have also linked the increase rate of imaging with the increase rate of surgery and also found early magnetic resonance imaging (MRI) had an eight-fold increased risk of surgery (Shubha, Deyo, & Berger, 2012; Webster & Cifuentes, 2010). In typical individuals with low back pain or radiculopathy, MR imaging does not appear to have measurable value in terms of planning conservative care. That knowledge of imaging findings does not alter outcome, and that individual knowledge of imaging findings is associated with a lesser sense of well-being (Modic et al., 2005).

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Myelopathy (SP-7)

Guideline

Myelopathy (SP-7.1)
Evidence Discussion (SP-7)
References (SP-7)

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Myelopathy (SP-7.1)

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Criteria

- Myelopathy is the development of abnormal spinal cord function with long tract signs usually secondary to spinal cord compression, but also inflammation (transverse myelitis, MS, etc.), neoplastic disease, or spinal cord infarction.
  - For imaging of transverse myelitis, see **Transverse Myelitis (HD-16.4)** in the Head Imaging Guidelines.
- Examination findings may include loss of manual dexterity, spastic legs, ataxia, hyperreflexia, upgoing toes (positive Babinski), Hoffmann's sign, sustained clonus, Lhermitte's sign, crossed radial reflex, inverted radial reflex, and/or finger escape sign. Sensory level and urinary incontinence/retention may be seen.
  - Advanced imaging is considered medically necessary in the initial evaluation of documented or reasonably suspected myelopathy.
- X-rays are not required for advanced imaging in individuals with potential myelopathy regardless of any history of spine surgery, trauma, or other reasons which may otherwise require x-rays (e.g., **Neck (Cervical Spine) Trauma (SP-3.2)**, **Upper Back (Thoracic Spine) Trauma (SP-4.2)**, **Post-Operative Spinal Disorders (SP-15)**).
- Conservative treatment is not a requirement for advanced imaging in individuals with potential myelopathy.
- MRI Cervical and Thoracic Spine without contrast, or without and with contrast, are considered medically necessary for:
  - evaluation of reasonably suspected myelopathy
  - post-traumatic syrinx with increased spinal pain or worsening neurological symptoms
  - sustained, prominent, and unexplained Lhermitte's sign
  - unexplained Babinski's or Hoffmann's signs
  - unexplained hyperreflexia
  - unexplained bilateral motor weakness
- MRI Cervical, Thoracic, and Lumbar Spine without contrast, or without and with contrast, are considered medically necessary for:
  - suspected tethered cord and/or low-lying conus medullaris
- CT without contrast, or CT with contrast (myelography), can also be considered for either of the following:
  - an alternative to MRI, when MRI is contraindicated
  - in addition to MRI, for surgical planning

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Background and Supporting Information

Lhermitte's sign – With the individual in the long leg sitting position on the examination table, the examiner passively flexes the individual's head and one hip simultaneously with the leg kept straight. A positive test occurs if there is sharp pain down the spine and into the upper or lower extremities.

Babinski's sign – The examiner runs a sharp instrument along the plantar surface of the foot from the calcaneus along the lateral border to the forefoot. A positive test occurs with extension of the great toe with flexion and splaying of the other toes. A negative test occurs with no movement of the toes at all or uniform bunching up of the toes.

Hoffman's sign – The examiner holds the individual's middle finger and briskly flicks the distal phalanx. A positive test is noted if the interphalangeal joint of the thumb of the same hand flexes.

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Evidence Discussion (SP-7)

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- MRI is well established in the literature as the primary imaging modality for evaluation of myelopathy. It provides superior soft tissue definition to other options and allows direct visualization of intramedullary cord signal changes which can affect prognosis and management (Agarwal et al., 2021).
- CT myelography is a complementary technique that may be used in situations where MRI cannot be performed or when additional anatomic detail is needed for procedural planning. It may allow better visualization of bony neuroforaminal narrowing and may provide additional anatomic information when the MRI is ambiguous (Agarwal et al., 2021; Song et al., 2009).
- CT can be useful in demonstrating bony encroachment on the cord, but MRI is superior in demonstrating bone marrow changes and intramedullary cord signal. It is of limited value in evaluation of non-compressive causes of myelopathy (Agarwal et al., 2021).

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References (SP-7)

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Lumbar Spine Spondylolysis/ Spondylolisthesis (SP-8)

Guideline

Spondylolysis (SP-8.1)
Spondylolisthesis (SP-8.2)
Evidence Discussion (SP-8)
References (SP-8)

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Spondylolysis (SP-8.1)

SP.SP.0008.1.A
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Criteria

Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider, unless otherwise specified below.

Indication	Imaging Study
• Clinical suspicion of spondylolysis is high	• X-ray is not required. • Tomographic SPECT Planar (CPT® 78803 or 78831) • SPECT/CT Hybrid (CPT® 78830 or 78832)
• Negative SPECT bone scan	MRI Lumbar Spine without contrast (CPT® 72148) **OR** CT Lumbar Spine without contrast (CPT® 72131)
• Evaluation of a lesion seen on SPECT bone scan	CT Lumbar Spine without contrast (CPT® 72131)
• Documented need for preoperative planning	MRI Lumbar Spine without contrast (CPT® 72148) **AND/OR** CT Lumbar Spine without contrast (CPT®72131)
• Documented failure of 6 weeks of provider-directed conservative treatment (which may include immobilization with a spinal orthosis) after the current set of symptoms or physical exam findings started or changed with clinical re-evaluation	MRI Lumbar Spine without contrast (CPT® 72148) **OR** CT Lumbar Spine without contrast (CPT® 72131)
• Evaluation for stress reaction in bone, to visualize nerve roots	MRI Lumbar Spine without contrast (CPT® 72148)
• When an MRI is medically necessary, however, it is contraindicated	CT Lumbar Spine without contrast (CPT® 72131)

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Indication	Imaging Study
• Evaluation of bony anatomy	CT Lumbar Spine without contrast (CPT® 72131)
• Monitor healing of a pars interarticularis fracture that was determined to have healing potential on a prior CT (i.e., non-sclerotic lesion)	CT Lumbar Spine without contrast (CPT® 72131) of the symptomatic spinal level

- For pediatric spondylolysis, see **Spondylolysis (PEDSP-2.4)** in the Pediatric and Special Populations Spine Imaging Guidelines.
- Bony healing cannot be achieved non-surgically in an established well defined isthmic pars interarticularis defect whether it is developmental or the result of a pars interarticularis fracture non-union. Repeat advanced diagnostic imaging is considered not medically necessary in this setting.

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Spondylolisthesis (SP-8.2)

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Criteria

- CT Lumbar Spine without contrast (CPT® 72131) or MRI Lumbar Spine without contrast (CPT® 72148) can be considered after plain x-ray (results of plain x-rays performed after the current episode of symptoms started or changed must be available to the requesting provider) for the following:
  - A documented failure of 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed and clinical re-evaluation (see also: **General Guidelines [SP-1.0]**); ***or***
  - Preoperative evaluation; ***or***
  - See: **Red Flag Indications (SP-1.2)**

Background and Supporting Information

- Stress reactions and stress fractures of the pars interarticularis are most common in athletes and others whose activities involve repetitive flexion/extension loading of the lumbar spine and may be acute or chronic and unilateral or bilateral. Pars interarticularis defects can be an incidental finding on plain x-rays and is frequently asymptomatic.
- Spondylolisthesis is the forward (anterolisthesis) or backward (retrolisthesis, usually not clinically significant) displacement of one vertebra in relation to an adjacent vertebra, most commonly at L4-5 and L5-S1, although other levels of the spine may be involved. Spondylolisthesis is often an incidental finding on plain x-ray and is frequently asymptomatic.

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Evidence Discussion (SP-8)

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Spondylolysis is a very common incidental finding on radiographs in the general population but majority will be asymptomatic (Standaert & Herring, 2000). Spondylolysis is one of the potential causes of back pain in gymnasts (Kruse & Lemmen, 2009). Symptomatic pars lesions are particularly a clinical problem in adolescent athletes (Standaert & Herring, 2000; Leone et al., 2011). Spondylolysis and spondylolisthesis are a common cause of low back pain especially in young athletes but is a less common cause of neurologic compromise (Foreman et al., 2013). Plain radiographs with particular views display the majority of defects (Harvey et al., 1998). MRI has sensitivity of 78% for detecting L4-L5 lumbar degenerative spondylolisthesis compared with 98% for lateral standing films (Kuhns et al., 2015). MRI is less sensitive than CT for detecting pars defects but it is useful for evaluating bone marrow edema,nerve root compression, and stress reactions (Leone et al., 2011).

Lumbar spondylolysis can heal with conservative treatment depending on the spinal level affected and stage of the defects. The site of defects in the pars, condition of contralateral pars, presence of spondylolisthesis, the degree of lumbar lordosis are among other factors significantly affecting union (Fujii et al., 2004).

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Lumbar Spinal Stenosis (SP-9)

Guideline

Lumbar Spinal Stenosis (SP-9.1)
Evidence Discussion (SP-9)
References (SP-9)

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Lumbar Spinal Stenosis (SP-9.1)

SP.ST.0009.1.A
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Criteria

- MRI Lumbar Spine without contrast (CPT® 72148) or CT Lumbar Spine without contrast (CPT® 72131) is considered medically necessary for those individuals with clinical suspicion of lumbar spinal stenosis if:
  - Documented failure of 6-week trial of provider-directed treatment after the current set of symptoms or physical exam findings started or changed and clinical re-evaluation (see also: **General Guidelines (SP-1.0)**); ***or***
  - Red Flag Indications (see: **Red Flag Indications (SP-1.2)**); ***or***
  - Severe symptoms of neurogenic claudication restricting normal activity or requiring the frequent use of narcotic analgesics
- A CT/Myelogram Lumbar Spine (CPT® 72132) may also be considered for individuals who have failed 6 weeks of provider-directed treatment if requested by the operating surgeon for surgical planning, especially for multi-level lumbar spinal stenosis.

Background and Supporting Information

Lumbar spinal stenosis refers to a decrease in the space available for the neural elements within the spinal canal that include spinal nerve roots and the cauda equina. It is usually a degenerative condition of the aging spine which can be asymptomatic or a common cause of buttock/low back and/or leg pain (neurogenic claudication) in this population. Neurogenic claudication is a common symptom of lumbar spinal stenosis that is aggravated by walking, especially down hills or stairs, with prolonged standing and is often relieved by sitting and bending forward. Neurogenic claudication should be differentiated from vascular claudication (leg/calf pain) that is often aggravated by walking and relieved fairly rapidly by stopping and rest. The differential diagnosis for lumbar spinal stenosis should include peripheral vascular disease, hip disorders, and peripheral neuropathy.

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Evidence Discussion (SP-9)

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A presumptive diagnosis of symptomatic lumbar stenosis can be made with the history and physical examination (Katz & Harris, 2008). Imaging can help differentiate neurogenic claudication from vascular claudication. MRI or CT may confirm the presence of spinal stenosis. The American College of Radiology (ACR) Appropriateness Criteria for low back pain (revised 2021) states MRI may be helpful when there is low back pain with radiculopathy or signs of spinal stenosis (Hutchins et al., 2021). Bony findings can be seen better on CT and soft-tissue lesions are more detectable on MRI (Hutchins et al., 2021). In individuals with subacute or chronic low back pain with or without radiculopathy that is a surgical or intervention candidate with persisting symptoms after six weeks of conservative treatment, CT lumbar spine without IV contrast can also be used to assess facets and neural foramina and is equal to MRI for predicting significant spinal stenosis (Hutchins et al., 2021). For those not responsive to conservative treatment, surgery should be considered. A prospective cohort study evaluating individual outcomes two years after spine surgery for spinal stenosis showed individuals had better outcomes than individuals who did not have surgery (Tosteson et al., 2008).

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Sacro-Iliac (SI) Joint Pain, Inflammatory Spondylitis/Sacroiliitis and Fibromyalgia (SP-10)

Guideline

Sacro-Iliac (SI) Joint Pain/Sacroiliitis (SP-10.1)
Inflammatory Spondylitis (SP-10.2)
Fibromyalgia (SP-10.3)
Evidence Discussion (SP-10)
References (SP-10)

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Sacro-Iliac (SI) Joint Pain/Sacroiliitis (SP-10.1)

SP.SI.0010.1.A
v1.0.2027

Criteria

- CT Pelvis without contrast (CPT® 72192) or MRI Pelvis without contrast (CPT® 72195) is considered medically necessary if:
  - Initial plain x-rays are equivocal or not diagnostic; ***and***
  - There is documented failure of 6 weeks of provider-directed treatment after the current set of symptoms or physical exam findings started or changed and clinical re-evaluation (see also: **General Guidelines (SP-1.0)**); ***or***
  - Any ONE of the following:
    - Fractures of the sacrum or sacroiliac joint(s); ***or***
    - See: **Red Flag Indications (SP-1.2)**; ***or***
    - Pre-operative planning
- For suspected neoplastic or infectious disease, see **Red Flags (SP-1.2)**.
- See: **Rheumatoid Arthritis (RA) and Inflammatory Arthritis (MS-15.1)** in the Musculoskeletal Imaging Guidelines

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Inflammatory Spondylitis (SP-10.2)

SP.SI.0010.2.A
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Criteria

- **Initial imaging (including ankylosing spondylitis in the absence of trauma)**
  - Plain x-rays are required initially, then:
    - MRI Sacroiliac Joints (MRI Pelvis) without and with contrast (CPT® 72197) AND MRI Spine area of interest without and with contrast) **OR**
    - MRI Sacroiliac Joints (MRI Pelvis) without contrast (CPT® 72195) AND MRI Spine area of interest without contrast **OR**
    - MRI Sacroiliac Joints (MRI Pelvis) without and with contrast (CPT® 72197) **OR**
    - MRI Sacroiliac Joints (MRI Pelvis) without contrast (CPT® 72195) **OR**
    - MRI Spine area of interest without and with contrast **OR**
    - MRI Spine area of interest without contrast **OR**
    - If MRI is contraindicated:
      - CT Sacroiliac Joints (CT Pelvis) without contrast (CPT® 72192) **OR**
      - CT Sacroiliac Joints (CT Pelvis) without contrast (CPT® 72192) AND CT Spine area of interest without contrast **OR**
      - CT Spine area of interest without contrast
  - When plain x-rays **AND** MRI of the sacroiliac joints are negative, then:
    - MRI Spine area of interest without and with contrast **OR**
    - MRI Spine area of interest without contrast **OR**
    - CT Spine area of interest without contrast
- **Follow-up imaging for treatment response or disease progression (including ankylosing spondylitis)**
  - Repeat plain x-rays show no progression of disease of the SI joints **OR** SI joints and spine area of interest then,
    - MRI Sacroiliac Joints (MRI Pelvis) without and with contrast (CPT® 72197) AND MRI Spine area of interest without and with contrast) **OR**
    - MRI Sacroiliac Joints (MRI Pelvis) without contrast (CPT® 72195) AND MRI Spine area of interest without contrast **OR**
    - MRI Sacroiliac Joints (MRI Pelvis) without and with contrast (CPT® 72197) **OR**
    - MRI Sacroiliac Joints (MRI Pelvis) without contrast (CPT® 72195)
- If there is documented ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis (DISH) and spine pain following trauma, then:

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- See: **Neck Trauma (SP-3.2)**, **Upper Back Trauma (SP-4.2)**, **Low Back Trauma (SP-6.2)**

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Fibromyalgia (SP-10.3)

SP.DI.0010.3.A
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Criteria

- Advanced diagnostic imaging is not supported by the scientific evidence for the evaluation and treatment of fibromyalgia.

Background and Supporting Information

- Sacroiliitis can present with pain localized to the SI joint or referred pain to the buttock and/or posterior thigh without neurologic signs or symptoms. Affected individuals can often point to the SI joint as the pain source. Provocative and/or therapeutic SI joint anesthetic/corticosteroid injections can have diagnostic value.

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Evidence Discussion (SP-10)

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For individuals with proven sacro-iliac joint disorders visible on routine plain x-rays, there is no evidence that advanced diagnostic imaging substantiates changes to individual management decisions.

X-rays are first line imaging for suspected inflammatory sacroiliitis but have a low sensitivity for detecting abnormalities in early disease, and x-ray findings may not be visible until several years after onset of symptoms (Bernard et al., 2017). SI Joint MRI is appropriate when x-ray is equivocal or non-diagnostic (Bernard et al., 2017). There is increase the diagnostic accuracy of MRI in sacroiliitis with use of contrast (Bernard et al., 2017). The benefits of contrast usage should be weighed against the need for IV access and increased cost (American College of Radiology [ACR], 2026). The risk of contrast reaction with MRI contrast agents is lower than with iodinated contrast agents with CT and the risk of nephrogenic systemic fibrosis in patients with renal failure has become negligible with the newer type 2 macrocyclic contrast agents (ACR, 2026). If an individual is unable to undergo MRI, a non-contrast CT may be helpful as it has improved sensitivity over conventional radiography for detection of subtle erosions, although it lacks sensitivity for inflammatory changes of inflammatory sacroiliitis (Bernard et al., 2017).

With suspected inflammatory spondylitis, x-rays are useful to assess for structural changes of syndesmophytes, erosions, vertebral body squaring, and ankylosis (Czuczman et al., 2021). MRI has shown inflammatory changes in the SI joints prior to visible x-ray changes in several studies. However, the ability of MRI to characterize inflammation in early ankylosing spondylitis, the ability of MRI to predict erosive changes, and the value of monitoring treatment effects using serial MRI studies remains controversial in adults (Czuczman et al., 2021).

Plain x-rays are not required prior to advanced imaging in individuals with documented ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis (DISH) and spine pain following trauma, due to high risk of spinal fractures even with low-energy trauma and the low specificity for fracture detection on x-ray in these individuals (Lantsman et al., 2020).

Advanced diagnostic imaging is not supported by scientific evidence for the evaluation and treatment of fibromyalgia.

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Spinal Compression Fractures (SP-11)

Guideline

Spinal Compression Fractures (SP-11.1)
Evidence Discussion (SP-11)
References (SP-11)

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Spinal Compression Fractures (SP-11.1)

SP.FX.0011.1.A
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Criteria

Individuals with no history of malignancy

- MRI without contrast, CT without contrast, or whole-body bone scan (CPT® 78306), SPECT (CPT® 78803), or SPECT/CT (CPT® 78830) of the affected spinal region is considered medically necessary after plain x-ray evaluation ***and*** the location of the individual's spinal pain is concordant with the spinal x-rays for any **ONE** of the following:
  - X-rays reveal a new spinal compression fracture; ***or***
  - X-rays are non-diagnostic and severe spinal pain persists for more than one week in an individual already predisposed to low energy/insufficiency fractures; ***or***
  - The age of the spinal compression fracture deformity on plain x-ray is indeterminate; ***or***
  - Surgical planning following known insufficiency spinal compression fractures in individuals who are candidates for kyphoplasty, vertebroplasty, or other spine surgical procedures

Individuals with a history of malignancy

- For individuals with new symptomatic or asymptomatic vertebral compression fractures on radiographs, please refer to the cancer-specific guidelines within the General Oncology Imaging Guidelines for appropriate imaging studies.
- See also: **Red Flag Indications (SP-1.2)**

Background and Supporting Information

Insufficiency/low energy spinal compression fractures of the spine occur due to the lack of structural integrity to withstand physiologic loads and minor spinal trauma. Low bone mineral density is the primary etiology for most of these fractures but could also occur in the setting of other bone disease and medical conditions, in addition to neoplastic disease and infection. Sudden localized back pain, with or without trauma, is a typical presentation of insufficiency/low energy spinal compression fractures and can often be an incidental finding on plain x-rays and can be asymptomatic.

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Evidence Discussion (SP-11)

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The diagnosis of a spinal compression fracture may be suspected based on history and physical examination. Plain anteroposterior and lateral radiographs are commonly used in the initial evaluation of a suspected compression fracture and can demonstrate characteristic findings such as vertebral height loss or wedge deformity (Old & Calvert, 2004; Alexandru & So, 2012).

Advanced imaging modalities may provide added diagnostic information, particularly when fractures are not well visualized on plain films or when further characterization of fracture morphology is needed (Old & Calvert, 2004; McCarthy & Davis, 2016).

It has been shown that bone marrow signal on MRI can help identify an acute fracture and distinguish ages of compression fractures (Yamato et al., 1998; Piazzolla et al., 2015). Additionally, the benefits of advanced imaging prior to vertebral augmentation have been reported (Benz et al., 2009; Ma et al., 2010; Spiegl et al., 2009).

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Spinal Pain Related to Cancer (SP-12)

Guideline

Spinal Pain Related to Cancer (SP-12)

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Spinal Pain Related to Cancer (SP-12)

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- For guidelines regarding advanced diagnostic imaging in this clinical setting, see **Spinal/Vertebral Metastases (ONC-31.6)**.

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Spinal Canal/Cord Disorders (e.g., Syringomyelia) (SP-13)

Guideline

Initial Imaging Pathway (SP-13.1)
Follow-up Imaging (SP-13.2)
Evidence Discussion (SP-13)
References (SP-13)

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Initial Imaging Pathway (SP-13.1)

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Criteria

- MRI Cervical Spine without contrast or without and with contrast (CPT® 72141 or CPT® 72156) and MRI Thoracic Spine without contrast or without and with contrast (CPT® 72146 or CPT® 72157) is considered medically necessary when syringomyelia is suspected.
- Once a syrinx is identified by prior imaging, the following are considered medically necessary if not already performed:
  - MRI Brain without contrast (CPT® 70551) to evaluate for syringobulbia **AND**
  - MRI Cervical Spine without contrast or without and with contrast (CPT® 72141 or CPT® 72156) **AND**
  - MRI Thoracic Spine without contrast or without and with contrast (CPT® 72146 or CPT® 72157) **AND**
  - MRI Lumbar Spine without contrast or without and with contrast (CPT® 72148 or CPT® 72158) to define the lower most extent of the syrinx or to identify a skip lesion

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Follow-up Imaging (SP-13.2)

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Criteria

- MRI Cervical Spine without contrast (CPT® 72141) and MRI Brain without contrast (CPT® 70551) and/or MRI Thoracic Spine without contrast (CPT® 72146) are considered medically necessary in any of the following scenarios:
  - If there is a concern for malignancy, imaging can be performed without and with contrast.
  - Annual imaging until non-progression of the syringomyelia is established
  - Following surgical treatment (including posterior fossa decompression)
  - Advanced diagnostic imaging every three years for life can be performed once non-progression of the syringomyelia is established.
  - Repeat advanced diagnostic imaging is considered medically necessary when there is evidence of neurologic deterioration.

Background and Supporting Information

Syringomyelia may begin to form in childhood but rarely becomes symptomatic before the adult years.

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Evidence Discussion (SP-13)

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- MRI of the cervical and thoracic spine is the preferred initial imaging for suspected syringomyelia because it is highly sensitive for detecting syrinx cavities and associated abnormalities such as Chiari malformations or CSF flow obstruction (Flint, 2021).
- Once a syrinx is identified, extending MRI to the brain and entire spinal axis can define the full extent of disease, identify skip lesions, and detect underlying causes such as tumors or hindbrain pathology, which is important given the variable presentation and poor correlation between symptoms and cavity size (Flint, 2021).
- MRI provides detailed, radiation-free evaluation that supports monitoring and surgical decision making, although repeated imaging may increase cost and incidental findings that do not correlate with symptoms, which should be balanced against the need to detect progression or complications (Flint, 2021).

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Spinal Deformities (e.g., Scoliosis/ Kyphosis) (SP-14)

Guideline

Spinal Deformities (e.g., Scoliosis/Kyphosis) (SP-14.1)
Revision Anterior Spinal Deformity Surgery (SP-14.2)
Evidence Discussion (SP-14)
References (SP-14)

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Spinal Deformities (e.g., Scoliosis/ Kyphosis) (SP-14.1)

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Criteria

- MRI without contrast, MRI without and with contrast, or CT/Myelography if MRI is contraindicated of the affected spinal regions is considered medically necessary after plain x-rays (e.g., Cobb radiographs) of the affected spinal regions have been performed and results are available to the requesting provider:
  - for pre-operative evaluation; ***or***
  - for cases of congenital scoliosis and other atypical curves that may be associated with spinal canal/cord pathology such as tethered cord, syringomyelia, diastematomyelia, or tumors; ***or***
  - for cases of scoliosis and/or kyphosis when there are associated neurologic signs and symptoms on physical examination; ***or***
  - scoliosis with a convex left thoracic curve due to a high association of a convex left thoracic curve with underlying spinal canal/cord pathology
- CT of the affected spinal regions (contrast as requested) is considered medically necessary in cases with a complex osseous deformity for pre-operative evaluation.
- CT Angiography (CTA) or MR Angiography (MRA) is considered not medically necessary for pre-operative planning for initial anterior spinal surgery for surgical correction of spinal deformities.

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Revision Anterior Spinal Deformity Surgery (SP-14.2)

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Criteria

- If requested by the operating surgeon, the following studies can be performed for pre-operative planning for revision of anterior thoracic or lumbar spinal surgery:
  - CTA Pelvis (CPT® 72191) **OR**
  - CTA Abdomen (CPT® 74175) **OR**
  - CTA Abdomen and Pelvis (CPT® 74174) **OR**
  - MRA Pelvis (CPT® 72198) and/or MRA Abdomen (CPT® 74185)

Background and Supporting Information

- Scoliosis is defined as a curvature of the spine in the coronal plane. Scoliosis can involve any or all levels of the spine but generally involves the thoracic and/or lumbar spine. Scoliosis initially occurs in the pediatric and adolescent population and persists throughout life. If scoliosis begins in adulthood, it is usually secondary to neurologic disorders (e.g., post-traumatic paralysis) or degenerative spondylosis. Sagittal plane spinal deformity (e.g., kyphosis, hyperlordosis) may be associated with scoliosis.

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Evidence Discussion (SP-14)

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Plain radiography continues to be the primary imaging modality for the initial diagnosis of spinal deformity and for follow-up of deformity progression (Calloni et al., 2017; Wright, 2000). Plain x-rays allow the easy measurement of Cobb angles which remains essential in the evaluation of scoliosis (Calloni et al., 2017).

Individuals with congenital scoliosis, atypical curves (e.g., left thoracic) or abnormal neurological findings will benefit from MRI to help identify spinal cord abnormalities (Calloni et al., 2017; Winter et al., 1992; Barnes et al., 1993; Belmont et al., 2004). CT is considered the gold standard for the evaluation of osseous structures and can be useful in the evaluation of complex bony deformity (Calloni et al., 2017). Additionally, MRI and CT can be valuable for pre-operative evaluation and can provide detailed characterization of neural axis abnormalities and deformity anatomy (Ozturk et al., 2010; Garg & Aryal, 2023; Negrini et al., 2018).

For revision anterior spinal deformity surgery, vascular imaging such as CT angiography or MR angiography may provide additional anatomic information for surgical planning, however, concerns associated with these modalities are radiation exposure with CT-based techniques, availability of the imaging modalities in close proximity to individuals, potential out of pocket costs to individuals, and sensitivity to individual movement with MRI (Gstöttner et al., 2011; Watson & Yu, 2023).

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Post-Operative Spinal Disorders (SP-15)

Guideline

Greater than Six Months Post-Operative (SP-15.1)
Routine Post-Fusion Imaging (SP-15.2)
Prolonged Intractable Pain Following Spinal Surgery Within Six Months (SP-15.3)
Revision Anterior Fusion Surgery (SP-15.4)
Evidence Discussion (SP-15)
References (SP-15)

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Greater than Six Months Post-Operative (SP-15.1)

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Criteria

- Following plain x-rays of the affected spinal regions post-surgical and performed after the current episode of symptoms started or changed with results available to the requesting provider, MRI without and with contrast, MRI without contrast, or CT without contrast of the affected spinal region(s) is considered medically necessary when:
  - Individual is more than 6 months post-operative ***AND***
  - There is a documented failure of a 6-week trial of provider-directed treatment after the current set of symptoms started or changed with clinical re-evaluation
  - If a Red Flag Indication is present, conservative care is not required. See: **Red Flag Indications (SP-1.2)**.
- See **Nuclear Medicine (SP-17)** for nuclear medicine imaging when MRI/CT are non-diagnostic in back pain with suspected failed fusion surgery.

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Routine Post-Fusion Imaging (SP-15.2)

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Criteria

- Following a clinically successful spinal fusion, advanced diagnostic imaging is generally considered not medically necessary.
- PET is not currently considered medically necessary for the routine assessment of spinal fusions or unsuccessful spine surgery (see also: **Spine PET (SP-2.10)**).

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Prolonged Intractable Pain Following Spinal Surgery Within Six Months (SP-15.3)

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Criteria

- Following plain x-rays of the affected spinal regions post-surgical with results available to the requesting provider, MRI without and with contrast of the affected spinal region(s) is considered medically necessary if there are residual, new, recurrent, or worsening symptoms related to the spinal region(s) for which surgery was performed within the last 6 months.
  - CT without contrast, or CT with contrast (Myelography) of the affected spinal region(s) if MRI is contraindicated.

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Revision Anterior Fusion Surgery (SP-15.4)

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Criteria

- If requested by the operating surgeon, the following studies for pre-operative planning prior to surgical revision of a thoracic or lumbar anterior spinal arthrodesis:
  - CTA Pelvis (CPT® 72191) **OR**
  - CTA Abdomen (CPT® 74175) **OR**
  - CTA Abdomen and Pelvis (CPT® 74174) **OR**
  - MRA Pelvis (CPT® 72198) and/or MRA Abdomen (CPT® 74185)

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Evidence Discussion (SP-15)

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Despite advances made in high-resolution spinal imaging, plain films remain integral in providing optimal care for spine individuals and continue to provide critical information that cannot be obtained with other imaging modalities (Goodwin, Buchowski, & Sciubba, 2022). X-ray imaging with anteroposterior, lateral, oblique, and flexion-extension views is considered the primary imaging modality for post-operative evaluation and can provide complementary information to advanced imaging (Hayashi et al., 2012; Hutchins et al., 2021). X-rays can provide information as to whether a concomitant instability is present which would further assist with pre-operative planning. Also, when prior surgery is a concern, x-ray provides additional clinical information as to the details of the hardware for which this detail can many times be obscured with advanced imaging techniques (MRI/CT). An x-ray often has a larger field-of-view than an MRI or CT and has the potential to identify more proximal or distal pathology in the spine that could ultimately assist in determining the individual's diagnosis (Goodwin, Buckowski, & Sciubba, 2022). X-rays can also determine whether an advanced diagnostic imaging study is actually needed, what specific advanced diagnostic imaging study is warranted, and if contrast is required.

There are minimal risks associated with advanced imaging including but not limited to radiation exposure, implanted device complications, metallic foreign body complications, and contrast complications (Watson & Yu, 2023) . Studies have also linked the increase rate of imaging with the increase rate of surgery and found early magnetic resonance imaging (MRI) had an eightfold increased risk of surgery (Srinivas, Deyo, & Berger, 2012; Eldaya et al., 2025).

Although most individuals with acute neck or back pain will improve with 6 weeks of conservative care (Hutchins et al., 2021; Chou et al., 2009; Childress & Becker, 2016), conservative care would not be necessary for individuals with prolonged intractable pain present within 6 months of surgery or if a red flag indication was present. In general, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

For revision thoracic or lumbar anterior spinal arthrodesis, vascular imaging such as CT angiography or MR angiography can provide detailed evaluation of vascular anatomy relevant to surgical planning, however, risks are present with these modalities including radiation exposure with CT-based techniques, availability of the imaging modalities in close proximity to individuals, potential out-of-pocket costs to individuals, and sensitivity to individual movement with MRI (Gstöttner et al., 2011; Watson & Yu, 2023).

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Other Imaging Studies and Procedures Related to the Spine Imaging Guidelines (SP-16)

Guideline

Prior to Spine Surgery (SP-16.1)
Prior to Interventional Spinal Injections (SP-16.2)
Prior to Spinal Cord Stimulator (SCS) Placement/Removal (SP-16.3)
Following Vertebral Augmentation Procedures (SP-16.4)
Evidence Discussion (SP-16)
References (SP-16)

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Prior to Spine Surgery (SP-16.1)

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Criteria

- Advanced imaging needed for surgical planning (e.g., MRI and/or CT) should be performed within the past 6 months for pre-operative planning prior to spine surgery when the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines. (See: **MRI of the Spine [SP-2.2]**, **CT of the Spine [SP-2.3]**, **CT/Myelography [SP-2.4]**)
- MR Angiography (MRA) and CT Angiography (CTA) are generally considered not medically necessary for pre-operative planning of initial anterior spinal surgery unless abnormal vasculature is known or reasonably anticipated.

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Prior to Interventional Spinal Injections (SP-16.2)

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Criteria

- Advanced diagnostic imaging studies of the spine are not required prior to facet joint injections, medial branch blocks, or radiofrequency ablations unless the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.
- Advanced diagnostic imaging studies of the cervical spine and/or thoracic spine are considered medically necessary within 24 months prior to interlaminar or transforaminal epidural steroid injections of the cervical and/or thoracic spine when the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.
- Advanced diagnostic imaging studies of the lumbar spine are considered medically necessary prior to transforaminal epidural steroid injections of the lumbar spine when the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.
- Advanced diagnostic imaging studies of the lumbar spine are not required prior to lumbar spine interlaminar or caudal epidural steroid injections unless the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.
- For an individual with evidence of symptomatic spinal stenosis, MRI or CT with or without myelography demonstrating severe spinal stenosis at the level to be treated within the past 24 months is required for an initial trial of a transforaminal, interlaminar, or caudal epidural steroid injection when **ALL** of the following criteria are met:
  - Diagnostic evaluation has ruled out other potential causes of pain
  - Significant functional limitations resulting in diminished quality of life and impaired age-appropriate activities of daily living (ADLs)
  - Failure of at least 4 weeks of conservative treatment (e.g., exercise, physical methods including physical therapy and/or chiropractic care, NSAIDs, and/or muscle relaxants)
- See: **Red Flag Indications (SP-1.2)** for severe radicular pain

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Prior to Spinal Cord Stimulator (SCS) Placement/Removal (SP-16.3)

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Criteria

- MRI Thoracic Spine without contrast (CPT® 72146) is generally the study of choice prior to SCS placement. CT Thoracic Spine without contrast (CPT® 72128) **OR** CT/ Myelography Thoracic Spine (CPT® 72129) are acceptable alternatives.
- Imaging of the lumbar spine is considered not medically necessary for placement nor removal of spinal cord stimulators because placement or removal is not affected by lumbar spine findings and does not require advance imaging.

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Following Vertebral Augmentation Procedures (SP-16.4)

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Criteria

- CT without contrast of the affected spinal region(s) within 24 hours post-procedure to evaluate neurologic sequelae resulting from cement extravasation

Background and Supporting Information

- Repeat advanced diagnostic imaging studies are not necessary with each spinal injection or series of spinal injections.

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Evidence Discussion (SP-16)

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- Advanced imaging prior to spine surgery has been shown to improve characterization of neural and osseous pathology and assist with procedural planning, particularly in identifying targets for intervention such as nerve root compression or spinal stenosis (Hutchins et al., 2021). However, imaging findings may not always correlate with symptoms and can contribute to increased interventions, including surgery, without clear improvement in clinical outcomes (Ghaly et al., 2015; Hutchins et al., 2021).
- Advanced imaging prior to interventional spinal injections may help identify underlying pathology and exclude serious conditions such as malignancy, infection, or hematoma when clinical concern is present (Ghaly et al., 2015). MRI has not been shown to change the outcome of interventional pain procedures in recent scientific evidence-based studies and without substantial change in the clinical picture or intervening surgery. Routine imaging in the absence of these factors may increase downstream utilization without improving clinical outcomes (Ghaly et al., 2015; Hutchins et al., 2021).
- Imaging prior to spinal cord stimulator placement can provide anatomic detail relevant to procedural planning, particularly in evaluating the spinal canal and epidural space at the level of lead placement (Hutchins et al., 2021). MRI is often preferred for evaluation of soft tissue structures, while CT or CT myelography may be used when MRI is contraindicated or limited by artifact. Imaging of regions outside the area of clinical concern may have limited diagnostic value in the absence of specific indications and may contribute to unnecessary resource utilization (Hutchins et al., 2021).
- Following vertebral augmentation procedures, CT imaging can provide detailed assessment of complications such as cement extravasation, which may result in neurologic deficits when involving the spinal canal or intradural space (Baek et al., 2021). Evidence suggests that most instances of cement leakage are asymptomatic and clinically insignificant, and therefore routine imaging is not required in the absence of symptoms. However, when neurologic deficits occur, prompt imaging evaluation is important to guide management and potential intervention (Baek et al., 2021).

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Nuclear Medicine (SP-17)

Guideline

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Nuclear Medicine (SP-17)

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Criteria

- For evaluation of suspected loosening of orthopedic implants, when recent plain x-ray is non-diagnostic:
  - Bone scan (CPT® 78315) **OR**
  - Distribution of Radiopharmaceutical Agent SPECT (CPT® 78803 or 78831) **OR**
  - SPECT/CT (CPT® 78830)
- Spine pain with suspected failed fusion surgery, with suspected painful pseudoarthrosis and MRI/CT are non-diagnostic:
  - Radiopharmaceutical Localization SPECT (CPT® 78803 or 78831) **OR**
  - SPECT/CT (CPT® 78830)
- Any of the following studies are considered medically necessary for initial evaluation of suspected spine osteomyelitis and for follow-up imaging for evaluation of response to treatment in established spine osteomyelitis:
  - 3-phase bone scan (CPT® 78315) of the spine **OR**
  - Bone SPECT (CPT® 78803 or 78831) or Bone SPECT/CT (CPT® 78830 or 78832) **OR**
    - SPECT CPT® codes include flow and blood pool and delayed SPECT imaging
  - Gallium scan whole-body (CPT® 78804) or Limited spine (CPT® 78801) **OR**
  - Gallium SPECT (CPT® 78803 or 78831) or SPECT/CT (CPT® 78830 or 78832) **OR**
  - Gallium scan whole-body (CPT® 78804) or Limited spine (CPT® 78801) with SPECT (CPT® 78803 or 78831) or SPECT/CT (CPT® 78830 or 78832)
  - **NOTE:** Any bone scan can be combined with any Gallium scan.
- Suspected spine infection (such as epidural abscess or discitis osteomyelitis) next imaging study
  - FDG-PET/CT whole-body when x-ray or CT are abnormal **AND** when MRI cannot be performed or is inconclusive
- For evaluation of facet arthropathy in individuals with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis:
  - Radiopharmaceutical Localization Inflammatory Imaging (one of CPT® codes: 78800, 78801, 78802, or 78803) **OR**
  - Distribution of Radiopharmaceutical Agent SPECT (CPT® 78803) **OR**
  - SPECT/CT (CPT® 78830)
- For the evaluation of back pain and suspected spondylolysis:
  - Radiopharmaceutical Agent SPECT (CPT® 78803 or 78831) **OR**

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- SPECT/CT (CPT® 78830 or 78832)

- For the evaluation of a new symptomatic compression fracture identified on radiographs or CT, and no known malignancy:
  - Whole body bone scan with add on SPECT (CPT® 78803) or SPECT/CT (CPT® 78830)
  - See also: **Spinal Compression Fractures (SP-11.1)**

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Evidence Discussion (SP-17)

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Nuclear medicine imaging provides functional assessment of bone turnover and inflammation, which can help detect active pathology when structural imaging is inconclusive. Bone scintigraphy with SPECT or SPECT/CT demonstrates high sensitivity for stress-related lesions and improves localization, though limited specificity and incidental findings may lead to additional imaging (Matesan et al., 2016). In suspected spinal infection, radionuclide techniques including bone scan, gallium, and FDG-PET show variable diagnostic accuracy, with FDG-PET demonstrating higher sensitivity and specificity while bone scintigraphy alone may be less specific in the presence of prior surgery or hardware (Palestro et al., 2021). The addition of SPECT/CT enhances diagnostic accuracy across indications such as pseudoarthrosis, implant evaluation, and facet arthropathy, but introduces additional radiation exposure and cost (Matesan et al., 2016; Palestro et al., 2021). There is no relevant literature to support the use of bone scan with single-photon emission CT (SPECT) or SPECT/CT in the initial evaluation of acute uncomplicated low back pain.

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Procedure Codes Associated with Spine Imaging

Guideline

Procedure Codes Associated with Spine Imaging

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Procedure Codes Associated with Spine Imaging

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MRI/MRA	CPT®
MRI Cervical without contrast	72141
MRI Cervical with contrast	72142
MRI Cervical without and with contrast	72156
MRI Thoracic without contrast	72146
MRI Thoracic with contrast	72147
MRI Thoracic without and with contrast	72157
MRI Lumbar without contrast	72148
MRI Lumbar with contrast	72149
MRI Lumbar without and with contrast	72158
MRA Spinal Canal	72159
MRI Pelvis without contrast	72195
MRI Pelvis with contrast	72196
MRI Pelvis without and with contrast	72197
MR Spectroscopy	76390

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MRI/MRA	CPT®
Magnetic resonance spectroscopy, determination and localization of discogenic pain (cervical, thoracic, or lumbar); acquisition of single voxel data, per disc, on biomarkers (ie, lactic acid, carbohydrate, alanine, laal, propionic acid, proteoglycan, and collagen) in at least 3 discs	0609T
Magnetic resonance spectroscopy, determination and localization of discogenic pain (cervical, thoracic, or lumbar); transmission of biomarker data for software analysis	0610T
Magnetic resonance spectroscopy, determination and localization of discogenic pain (cervical, thoracic, or lumbar); postprocessing for algorithmic analysis of biomarker data for determination of relative chemical differences between discs	0611T
Magnetic resonance spectroscopy, determination and localization of discogenic pain (cervical, thoracic, or lumbar); interpretation and report	0612T

CT	CPT®
CT Cervical without contrast	72125
CT Cervical with contrast (Post-Myelography CT)	72126
CT Cervical without and with contrast	72127
CT Thoracic without contrast	72128
CT Thoracic with contrast (Post-Myelography CT)	72129
CT Thoracic without and with contrast	72130
CT Lumbar without contrast	72131
CT Lumbar with contrast (Post-Myelography CT)	72132
CT Lumbar without and with contrast	72133

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CT	CPT®
CT Pelvis without contrast	72192
CT Pelvis with contrast	72193
CT Pelvis without and with contrast	72194

Ultrasound	CPT®
Spinal canal ultrasound	76800

Nuclear Medicine	CPT®
Bone Marrow Imaging, Limited	78102
Bone Marrow Imaging, Multiple	78103
Bone Marrow Imaging, Whole Body	78104
Bone or Joint Imaging, Limited	78300
Bone or Joint Imaging, Multiple	78305
Bone Scan, Whole Body	78306
Bone Scan, 3 Phase Study	78315
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (e.g., head, neck, chest, pelvis), single day imaging	78800
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (e.g., abdomen and pelvis, head, and chest), 1 or more days imaging or single area imaging over 2 or more days	78801

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Nuclear Medicine	CPT®
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging	78802
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (e.g., head, neck, chest, pelvis), single day imaging	78803
Radiopharmaceutical localization of a tumor, inflammatory process, or distribution of radiopharmaceutical agents, including vascular flow and blood pool imaging when performed, planar, whole body, requiring two or more days of imaging	78804
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (e.g., head, neck, chest, pelvis), single day imaging	78830
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78831
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired CT transmission scan for anatomical review, localization, and determination/detection of pathology, minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78832
Radiopharmaceutical quantification measurement(s) single area (list separately in addition to code for primary procedure)	78835

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General Guidelines (PEDAB-1)

Guideline

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Pediatric Abdominal Imaging Age Considerations (PEDAB-1.1)
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General Guidelines (PEDAB-1.0)

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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms may serve as a pertinent clinical evaluation.
- These guidelines are based on the use of advanced imaging to answer specific clinical questions that will affect individual management. Imaging is considered not medically necessary when the results are not expected to affect individual management decisions. Standard medical practice dictates continuation of conservative therapy prior to advanced imaging in individuals who are improving on current treatment programs.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the abdomen is considered not medically necessary. Advanced imaging should only be considered medically necessary in individuals with documented active clinical signs or symptoms of disease.
- Unless otherwise stated in a specific guideline section, repeat advanced imaging of the same body area is considered not medically necessary unless there is documented evidence of progression of disease, new onset of disease, and/or documentation of how repeat imaging will alter individual management or treatment decisions.
- Ultrasound is considered medically necessary as the initial imaging study of choice in most pediatric individuals with abdominal conditions and should be performed prior to advanced imaging.
  - When advanced imaging is needed after ultrasound, the ultrasound findings can help guide selection of the appropriate modality, body area, imaging sequences, and contrast level to optimize diagnostic accuracy.
  - CPT® codes vary by body area and by presence or absence of Doppler imaging and are included in the table at the end of this guideline.

Red Flags

- The presence of any red flag signs or symptoms listed below in a pediatric individual with abdominal pain warrants further investigation. An initial ultrasound is not

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required, and while additional laboratory testing may be helpful, it is not required. Requests for appropriate advanced imaging (e.g., CT or MRI) may be approved in accordance with the applicable condition-specific guideline.
  - Pain that awakens the pediatric individual from sleep
  - Unexplained fever greater than 100.4°F
  - History of malignancy with documented risk of abdominal or intra-abdominal metastasis
  - Dysphagia
  - Gastrointestinal (GI) bleeding
  - Significant or persistent vomiting
  - Elevated white blood cell count (WBC) above the testing laboratory's reference range
  - Low WBC (absolute neutrophil count less than 1,000 cells/mm³)
  - Guarding, rebound tenderness, or other peritoneal signs
  - Severe chronic diarrhea or nocturnal diarrhea in a toilet-trained child
  - Faltering weight (failure to thrive), unintentional weight loss, delayed linear growth, or delayed pubertal development
  - Family history of inflammatory bowel disease, familial polyposis syndrome, celiac disease, or peptic ulcer disease
  - Abdominal mass, hepatomegaly, and/or splenomegaly on physical examination
  - Jaundice
  - Perianal disease
  - Suspected or confirmed COVID-19 infection with concern for multisystem inflammatory syndrome in children (MIS-C)
  - Failure to respond to four weeks of provider-directed conservative care within the previous 60 days
- See the condition-specific sections for when the above list of exclusionary criteria applies and warrant direct progression to advanced imaging.
- The appropriate advanced imaging modality for each condition is listed in the corresponding condition-specific section.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Pediatric Abdominal Imaging Age Considerations (PEDAB-1.1)

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- Many abdominal conditions affecting the pediatric population differ from those occurring in the adult population. For conditions that occur in both pediatric and adult populations, differences in management may exist due to age, comorbidities, and variations in the natural history of disease.
- Individuals under 19 years of age should be imaged according to the Pediatric Abdomen Imaging Guidelines when applicable.
  - Conditions not addressed in the Pediatric Abdomen Imaging Guidelines should be managed according to the General Abdomen Imaging Guidelines.
- Individuals 19 years of age or older should be imaged according to the General Abdomen Imaging Guidelines unless a condition-specific guideline directs otherwise.

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Pediatric Abdomen Imaging Modality General Considerations (PEDAB-1.3)

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Criteria

- MRI
  - MRI of the Abdomen is generally performed without and with contrast (CPT® 74183), unless the individual has a documented contraindication to gadolinium or otherwise specified in a condition-specific guideline section.
  - Due to duration of MRI acquisition and the need to minimize individual movement, anesthesia is typically required for most infants (excluding neonates), children younger than seven years of age, and older children with developmental or maturity-related limitations.
  - MRI protocols in this population should aim to minimize anesthesia exposure. When intravenous access has already been established for anesthesia and there are no contraindications to contrast, performing MRI both without and with contrast may be appropriate to avoid repeat imaging and additional anesthesia if the non-contrast study is inconclusive.
    - If multiple body areas are considered medically necessary by these guidelines for the clinical condition being evaluated, MRI of all necessary body areas may be obtained concurrently during the same imaging session.
  - The presence of surgical hardware or implanted devices may preclude MRI.
    - The selection of best examination may require coordination between the provider and the imaging facility. In these circumstances, CT may be the preferred imaging modality.
- CT
  - CT of the Abdomen typically extends from the dome of the diaphragm to the upper margin of the sacroiliac joints. CT of the Abdomen and Pelvis extends from the dome of the diaphragm through the ischial tuberosities.
    - CT Abdomen is generally used for evaluation of solid organs, whereas CT Abdomen and Pelvis is preferred for inflammatory, infectious, or hematuria-related conditions and when both regions are involved. Imaging may be limited to the region of interest, particularly during follow-up evaluation, to reduce radiation exposure.
  - Contrast use in the pediatric population should be based on the clinical indication. CT may be appropriate for further evaluation of findings identified on prior imaging

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or as specified in condition-based guideline sections; however, CT should not replace MRI solely to avoid sedation unless otherwise recommended.
    - Coordination between the provider and imaging facility may be necessary to determine the most appropriate imaging study.
- Nuclear Medicine
    - Nuclear medicine studies are commonly used in the evaluation of pediatric renal and hepatobiliary conditions. Additional indications include the following:
        - Esophageal motility study (CPT® 78258) and/or Gastroesophageal reflux study (CPT® 78262) is considered medically necessary for the evaluation of gastroesophageal reflux.
    - Nuclear intestinal imaging (preferred code for Meckel's scan, CPT® 78290) or Gastric mucosa imaging (alternate code for Meckel's scan, CPT® 78261) is considered medically necessary for the following:
        - Suspected Meckel's diverticulum
        - Gastric mucosa imaging (CPT® 78261) is also considered medically necessary for:
            - Barrett's esophagus
            - Thoracic masses suspected of containing gastric mucosa
    - Gastric emptying study (CPT® 78264) is considered medically necessary for the evaluation of suspected delayed or rapid gastric emptying.
    - Gastric emptying study with small bowel transit (CPT® 78265) is considered medically necessary for the evaluation of suspected abnormalities in both total and regional small bowel transit times.
    - Gastric emptying study with small bowel and colon transit (CPT® 78266) is considered medically necessary for the evaluation of suspected abnormalities in both total and regional colonic transit times.
    - Gastrointestinal bleeding scintigraphy (CPT® 78278) is considered medically necessary for the evaluation of brisk active GI bleeding with indeterminate endoscopic findings.
    - Gastrointestinal protein loss study (CPT® 78282) is considered medically necessary for decreased serum albumin or globulin levels and no evidence of GI bleeding.
    - Peritoneal-venous shunt patency study (CPT® 78291) is considered medically necessary for the evaluation of shunt patency and function in individuals with ascites.
    - Nuclear renal imaging (CPT® 78701, CPT® 78707, CPT® 78708, or CPT® 78709) is considered medically necessary for evaluation of the following:
        - Renal transplant follow-up
        - Kidney salvage versus nephrectomy surgical decisions
        - Acute renal failure with no evidence of obstruction on recent ultrasound

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        - Chronic renal failure to estimate prognosis for recovery
- 3D Rendering
    - 3D Rendering indications in pediatric abdomen imaging are identical to those in the General Imaging Guidelines. See: **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

Evidence Discussion

Magnetic resonance imaging (MRI) is a preferred cross-sectional imaging modality in pediatric abdominal evaluation due to its absence of ionizing radiation and superior soft-tissue contrast. These characteristics are particularly important in children who may require serial imaging or detailed tissue characterization over time. The American College of Radiology (ACR) and the Society for Pediatric Radiology (SPR) recommend MRI without and with contrast when contrast enhancement is expected to meaningfully increase diagnostic confidence or resolve indeterminate findings from prior imaging studies (American College of Radiology & Society for Pediatric Radiology, 2022).

Concerns regarding gadolinium-based contrast agents (GBCAs) stem primarily from evidence of gadolinium retention within the brain and other tissues. Early pediatric-focused literature documented signal intensity changes in deep brain nuclei following repeated GBCA exposure, establishing the biological plausibility of tissue deposition without demonstrating clinical sequelae (Blumfield et al., 2019). These findings prompted closer scrutiny of GBCA pharmacokinetics and reinforced the need for indication-driven use rather than routine administration.

Subsequent investigations have shifted the focus from tissue deposition alone to clinically relevant outcomes. A recent systematic review and meta-analysis incorporating pediatric-specific data found no association between GBCA exposure and adverse neurologic or systemic outcomes in children, including those with multiple prior contrast administrations (Yu et al., 2025). This analysis strengthens earlier observational data by providing pooled outcome-level evidence with extended follow-up, supporting the conclusion that gadolinium retention has not been shown to result in measurable clinical harm under current clinical practice.

Regulatory and professional guidance reflects this evolving evidence base. Contemporary literature indicates that, although gadolinium retention following GBCA exposure is well documented, current data have not demonstrated clinically significant adverse health effects attributable to this retention in patients with normal renal function (Starekova et al., 2024). Accordingly, expert consensus supports the continued use of GBCAs when clinically justified, emphasizing appropriate agent selection and risk–benefit assessment rather than avoidance based solely on retention concerns.

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Consistent with this position, the ACR Manual on Contrast Media emphasizes selective GBCA administration based on anticipated diagnostic benefit, particularly in pediatric populations, rather than avoidance driven solely by retention concerns (American College of Radiology & Society for Pediatric Radiology, 2022).

Complementing imaging guidance, broader pediatric care frameworks further emphasize evidence-based, targeted evaluation strategies. The joint North American Society For Pediatric Gastroenterology, Hepatology & Nutrition (NASPGHAN) and American Academy of Pediatrics (AAP) clinical practice guideline provides standardized recommendations for the diagnosis and management of faltering weight in pediatric individuals, replacing the outdated term "failure to thrive." The guideline emphasizes the use of z-score–based growth criteria, targeted diagnostic testing, and early nutritional intervention supported by multidisciplinary care. Collectively, these recommendations aim to reduce unnecessary testing, improve growth outcomes, and promote family-centered, non-stigmatizing care (Kersten et al., 2026). This emphasis on judicious, indication-driven evaluation aligns with imaging best practices, reinforcing the importance of avoiding unnecessary interventions while ensuring clinically meaningful diagnostic yield.

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Generalized Abdominal Pain (PEDAB-2)

Guideline

Generalized Abdominal Pain (PEDAB-2)
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Generalized Abdominal Pain (PEDAB-2)

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Criteria

- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary as the initial imaging study for pediatric individuals without red flag signs or symptoms and with a normal physical examination and normal laboratory studies.
  - Relevant laboratory evaluation may include complete blood count (CBC), electrolytes, lipase, amylase, urinalysis, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), liver function tests (LFTs), and/or stool studies, including fecal occult blood testing and stool culture when diarrhea is present.
- CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) are considered medically necessary when any red flag signs or symptoms are present (as listed in **General Guidelines (PEDAB-1.0))**.
- Pediatric individuals with abdominal pain that can be localized to a particular area of the abdomen should be imaged according to the relevant guideline section:
  - **Right Lower Quadrant Pain (PEDAB-3)**
  - **Flank Pain, Renal Stone (PEDAB-4)**
  - **Right Upper Quadrant Pain (PEDAB-8)**
  - **Left Upper Quadrant Pain (PEDAB-25)**
  - **Left Lower Quadrant Pain (PEDAB-29)**

Background and Supporting Information

Pediatric abdominal pain encompasses a spectrum of conditions ranging from disorders of gut–brain interaction (DGBI) to acute inflammatory and surgical diseases. Under the Rome V framework, DGBI are defined by gastrointestinal symptoms arising from altered gut–brain signaling rather than structural or biochemical abnormalities (Drossman et al., 2026; Maqbool et al., 2024).

A substantial proportion of pediatric cases represent functional abdominal pain disorders, including functional dyspepsia, irritable bowel syndrome, and centrally mediated abdominal pain syndrome (Maqbool et al., 2024; Drossman et al., 2026). These conditions are characterized by symptoms such as epigastric pain or burning, postprandial fullness, and early satiety and may coexist with other gastrointestinal or systemic conditions (Drossman et al., 2026; Maqbool & Liacouras, 2024).

Clinical evaluation is guided by symptom characteristics, pain location, associated features, and age-specific considerations (Buel et al., 2024; Kim, 2013; Maqbool & Liacouras, 2024). Society recommendations, including Rome V criteria and the

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American College of Radiology (ACR) Appropriateness Criteria®, supports a structured clinically driven approach to evaluation and management (Drossman et al., 2026; Expert Panel on Pediatric Imaging et al., 2026).

Because many functional abdominal pain disorders and other DGBI are not associated with structural abnormalities, advanced imaging is often not routinely indicated. However, in pediatric individuals with persistent, atypical, or diagnostically complex presentations, gastroenterology (GI) specialist evaluation or consultation may be helpful in determining the need for advanced imaging and additional diagnostic testing, particularly when distinguishing DGBI from inflammatory, structural, or surgical conditions. This collaborative approach supports appropriate use of imaging while minimizing unnecessary diagnostic procedures (Expert Panel on Pediatric Imaging et al., 2026; Rosen et al., 2026).

Evidence Discussion

Evidence supports an initial clinical assessment of pediatric abdominal pain based on symptom patterns, pain localization, associated systemic findings, and age-specific factors to determine the need for imaging (Buel et al., 2024; Maqbool & Liacouras, 2024).

A large proportion of cases are attributable to disorders of gut–brain interaction, which are diagnosed clinically and lack identifiable structural pathology. In the absence of alarm features, routine imaging has not been shown to improve clinical outcomes and may lead to unnecessary downstream testing and increased healthcare utilization (Drossman et al., 2026; Maqbool & Liacouras, 2024).

When imaging is clinically indicated, evidence-based guidelines support ultrasound as the preferred initial imaging modality for many pediatric abdominal pain presentations due to its diagnostic accuracy and lack of ionizing radiation. Advanced imaging with CT or MRI is reserved for cases with equivocal ultrasound findings, suspected complications, or specific clinical scenarios as defined in condition-specific guidelines (Expert Panel on Pediatric Imaging, 2026).

Collectively, these data support reserving imaging for pediatric individuals with alarm features, abnormal physical examination findings, abnormal laboratory studies, persistent symptoms, or clinical concern for an underlying organic disorder. This approach balances diagnostic yield with avoidance of unnecessary imaging and radiation exposure (Buel et al., 2024; Expert Panel on Pediatric Imaging, 2026).

Health Equity Considerations

Abdominal pain is a common reason for Emergency Department (ED) assessment in the pediatric population. Children with abdominal pain are assessed for conditions that require urgent evaluation and treatment such as appendicitis, intussusception, volvulus,

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or adhesion (Kim, 2013). Appendicitis is an important diagnostic differential to consider for acute abdominal pain for potential urgent or emergent abdominal surgery. Health outcomes are dependent on appropriate diagnosis and treatment (Wang et al., 2015).

Health disparities influence children's healthcare as they may have long-term impacts on important outcomes such as health as an adult, educational attainment, and economic success (Montoya-Williams et al., 2020). Health disparities facing minority children with abdominal pain include lack of advanced imaging such as ultrasound or computed tomography (CT) scan, and having a higher appendiceal perforation rate (Goyal et al., 2021). Studies have shown that racial and ethnic minorities are less likely to receive opioid analgesia even when symptoms are severe (Guedj et al., 2021). Lastly, non-Hispanic Black and Hispanic individuals were more likely than non-Hispanic whites to have a prolonged length of stay (Johnson et al., 2013). Solutions to health disparity issues include continued data and research, policy interventions, and individual and family engagement.

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Right Lower Quadrant Pain (PEDAB-3)

Guideline

Right Lower Quadrant Pain (PEDAB-3)
References (PEDAB-3)

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Right Lower Quadrant Pain (PEDAB-3)

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Criteria

- The presence of any red flag findings per **General Guidelines (PEDAB-1.0)** precludes adjudication based on any other criteria.
- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary as the initial imaging study.
  - If ultrasound findings are positive or negative for uncomplicated appendicitis, no further imaging is considered medically necessary.
  - If the appendix is not visualized on ultrasound and the white blood cell count is not elevated, no further imaging is considered medically necessary.
- CT Abdomen and Pelvis with contrast (CPT® 74177), MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195), or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary for ANY of the following:
  - Individuals who are overweight (BMI at or above the 85th percentile for age)
  - Insufficient local ultrasound expertise
  - Ultrasound findings are inconclusive
  - Clinical suspicion or initial imaging findings suggestive of a complication (e.g., abscess, bowel obstruction)
- If the appendix is absent, follow guidelines in: **Generalized Abdominal Pain (PEDAB-2)**

Evidence Discussion

Ultrasound demonstrates high specificity and clinically useful sensitivity for appendicitis, particularly in pediatric settings, and can aid in distinguishing uncomplicated from complicated disease (Badlis et al., 2024). Although nonvisualization of the appendix remains a limitation, secondary sonographic findings can still provide important diagnostic information. Comparative evidence indicates that, while CT and MRI demonstrate higher sensitivity, ultrasound offers strong diagnostic performance without radiation exposure or the routine need for sedation, supporting a staged imaging approach rather than the use of cross-sectional imaging as a first-line modality (Castro-Luna et al., 2025).

The AJR Expert Panel and the ACR Appropriateness Criteria® recommend an ultrasound-first pathway, reserving CT or MRI for equivocal studies or ongoing clinical concern (Desoky et al., 2023). When ultrasound findings and laboratory results are not

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suggestive of appendicitis, the decision to pursue additional imaging may appropriately rely on the referring clinician's assessment of the overall clinical course.

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Flank Pain, Renal Stone (PEDAB-4)

Guideline

Flank Pain, Renal Stone (PEDAB-4)
References (PEDAB-4)

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Flank Pain, Renal Stone (PEDAB-4)

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Criteria

- The presence of any red flag findings per **General Guidelines (PEDAB-1.0)** precludes adjudication based on any other criteria.
- Flank pain imaging indications in pediatric individuals are similar to those for adult individuals. See: **Flank Pain, Rule Out or Known Renal/Ureteral Stone (AB-4)** in the Abdomen Imaging Guidelines.
  - Ultrasound retroperitoneal (CPT® 76770 or CPT®76775) is considered medically necessary as the initial imaging study for the evaluation of flank pain in pediatric individuals.
  - CT Abdomen and Pelvis without contrast (CPT® 74176) is considered medically necessary when ultrasound findings are inconclusive.
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary when CT imaging is inconclusive or when there is significant concern regarding cumulative radiation exposure due to frequent CT imaging.
  - If hematuria is present, see: **Hematuria (PEDAB-7)** for imaging guidelines.
- Nuclear kidney imaging (CPT® 78707, CPT® 78708, CPT® 78709, or CPT® 78803) is considered medically necessary for evaluation of recurrent flank pain when CT and ultrasound findings are non-diagnostic or for suspected obstructive uropathy.

Evidence Discussion

In pediatric individuals presenting with flank pain or hematuria, imaging is used to confirm urolithiasis, assess for obstruction, and guide management while limiting radiation exposure.

Current American College of Radiology (ACR) Appropriateness Criteria® recommend ultrasound as the initial imaging modality due to its safety profile and ability to detect hydronephrosis, renal calculi, and secondary signs of obstruction without ionizing radiation (Expert Panel on Pediatric Imaging, 2018; Expert Panel on Urological Imaging, 2023).

Computed tomography (CT) is reserved for cases with nondiagnostic ultrasound findings and persistent clinical concern, with emphasis on selective use and radiation dose optimization when required (Expert Panel on Urological Imaging, 2023).

Although CT remains the preferred cross-sectional imaging modality for nephrolithiasis, MRI is appropriate when further evaluation of obstruction, associated complications,

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or indeterminate imaging findings is required and radiation exposure is a significant concern (Expert Panel on Urological Imaging, 2023).

Renal scintigraphy is not routinely used for acute stone detection but plays a targeted role in evaluating renal function and suspected obstruction when structural imaging is inconclusive (American College of Radiology, 2022).

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Urinary Tract Infection (UTI) (PEDAB-5)

Guideline

Upper Urinary Tract (PEDAB-5.1)
Lower Urinary Tract (PEDAB-5.2)
References (PEDAB-5)

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Upper Urinary Tract (PEDAB-5.1)

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Criteria

- Ultrasound retroperitoneal (CPT® 76770 or CPT® 76775) is considered medically necessary as the initial imaging study for first-time upper urinary tract infection in pediatric individuals to evaluate for hydronephrosis, pyelonephritis, or congenital renal anomalies.
  - If hydronephrosis is present, further evaluation with voiding cystourethrography (VCUG) is considered medically necessary to evaluate for vesicoureteral reflux.
    - In male individuals, fluoroscopic VCUG using iodinated contrast is considered medically necessary to evaluate for vesicoureteral reflux and to exclude urethral abnormalities.
    - In female individuals, either of the following are considered medically necessary for evaluation of vesicoureteral reflux:
      - Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram) (CPT® 78740) OR
      - Fluoroscopic VCUG
    - Contrast Enhanced Voiding Urosonography (CeVUS) is considered medically necessary for vesicoureteral reflux when performed at institutions with expertise in this modality.
- Diuretic renography using Tc-99m MAG 3 (CPT® 78707, CPT® 78708, or CPT® 78709) is considered medically necessary for:
  - Differentiation of dilated, non-obstructed urinary system from a true stenosis (e.g., ureteral-pelvic junction [UPJ] or ureterovesical junction obstruction)
  - Quantification of renal parenchymal function
  - Evaluation of ultrasound findings consistent with a multicystic dysplastic kidney to assess function of the affected kidney or to evaluate a ureteral-pelvic junction (UPJ) obstruction of the contralateral kidney
  - Diagnostic evaluation of upper urinary tract dilatation when VCUG findings are negative
  - Evaluation of renal function in individuals with hydronephrosis
- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary to evaluate the entire genitourinary tract for congenital abnormalities of distal urinary structures in individuals with complicated pyelonephritis.
- Magnetic resonance urography (MRU) (CPT® 74183 and CPT® 72197) is not considered a first-line imaging modality for routine evaluation of a urinary tract

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infection (UTI) but is considered medically necessary, when available, for evaluation of upper urinary tract dilation.

- Technetium-99m-dimercaptosuccinic acid (Tc-99m DMSA) scintigraphy (CPT® 78700, CPT® 78701, or CPT® 78803), is sensitive for evaluation of renal cortical damage.
  - DMSA scintigraphy is considered medically necessary for:
    - individuals with atypical or recurrent febrile acute urinary tract infections
      - Atypical findings may include lack of clinical improvement to antibiotics within 48 hours, elevated creatinine, poor urine stream, or infection caused by a non-Escherichia coli organism
    - individuals older than 5 years of age with febrile urinary tract infections and known vesicoureteral reflux
    - detection of post-pyelonephritic renal scarring at least 6 months after the documented upper tract UTI in high-risk individuals with recurrent UTIs
- Radiopharmaceutical nuclear medicine imaging (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, CPT® 78830, CPT® 78831, or CPT® 78832) is considered medically necessary for evaluation of suspected pyelonephritis or diffuse interstitial nephritis.
- Nuclear non-imaging renal function study (CPT® 78725) is considered medically necessary for quantitative assessment of renal function.
- Ultrasound kidneys and bladder (CPT® 76770 or CPT® 76775) (preferred) and/or Voiding Cystourethrography (CPT® 78740) are considered medically necessary for pediatric individuals with:
  - Recurrent febrile urinary tract infections; OR
  - Atypical urinary tract infection, including:
    - lack of clinical improvement to antibiotics within 48 hours
    - sepsis
    - poor urine stream
    - elevated creatinine
    - non-Escherichia coli infection

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Lower Urinary Tract (PEDAB-5.2)

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Criteria

- Ultrasound retroperitoneal (CPT® 76770 or CPT® 76775) is considered medically necessary as the initial imaging study for pediatric individuals with a first-time urinary tract infection (UTI) to evaluate for hydronephrosis, pyelonephritis, or congenital renal anomalies.
  - Fluoroscopic Voiding cystourethrography (VCUG) is considered medically necessary for detection of possible vesico-ureteral reflux (VUR) in neonates or young children when hydronephrosis is seen on ultrasound.
- VCUG should be deferred until a second UTI occurs unless earlier evaluation is warranted due to ANY of the following:
  - atypical or complex clinical circumstances
  - renal or bladder ultrasound findings that reveal hydronephrosis, scarring, or obstructive uropathy
- Vesicoureteral Reflux (VUR)
  - Fluoroscopic VCUG is the standard initial imaging modality for the diagnosis and grading of VUR.
  - For follow-up imaging of known VUR, any of the following are considered medically necessary:
    - Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram) (CPT® 78740),
    - Fluoroscopic VCUG, or
    - Contrast-enhanced voiding urosonography (CeVUS)
- Male individuals with a first-time UTI should be evaluated with fluoroscopic VCUG rather than radionuclide cystography to allow for visualization of the male urethra and assessment for possible abnormalities, such as posterior urethral valves, strictures, or diverticula.
- In female individuals, radionuclide cystography (CPT® 78740) or fluoroscopic VCUG is considered medically necessary as the initial imaging study.
- Magnetic resonance urography (MRU) is considered medically necessary for evaluation of ectopic distal ureteral insertion or other complex lower urinary tract anatomy.
- Siblings of individuals with known vesicoureteral reflux can undergo Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram) (CPT® 78740) when either of the following is present:
  - renal scarring identified on ultrasound
  - history of UTI without prior evaluation for VUR

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Evidence Discussion

Imaging for pediatric urinary tract infection (UTI) is guided by the goal of identifying clinically significant abnormalities while avoiding unnecessary radiation exposure and invasive testing. Renal and bladder ultrasound (RBUS) is recommended as the initial imaging study after a febrile UTI because it is noninvasive and does not involve ionizing radiation. Evidence from a systematic review and meta-analysis of 29 studies including 9,170 children demonstrated that although ultrasound abnormalities are identified in approximately 22% of children after a first febrile UTI, only about 3% represented clinically important findings that altered management, supporting a selective imaging approach (Yang et al., 2023).

The ACR Appropriateness Criteria® for pediatric UTI reinforce ultrasound as the preferred initial modality for uncomplicated infection and do not recommend routine VCUG after a first UTI (Chandra et al., 2024). The ACR–Society for Pediatric Radiology (SPR) Practice Parameter further specifies that VCUG should be reserved for children with abnormal ultrasound findings, recurrent febrile UTIs, suspected anatomic obstruction, or vesicoureteral reflux (American College of Radiology [ACR], 2019).

CT imaging is not routinely used in the evaluation of pediatric UTI and is limited to complicated or atypical cases, such as severe pyelonephritis, poor response to therapy, or concern for abscess formation (Smith, 2022).

When assessment of renal cortical involvement or long-term renal injury is clinically warranted, technetium-99m DMSA scintigraphy may be used selectively. The updated Society of Nuclear Medicine and Molecular Imaging (SNMMI)/European Association of Nuclear Medicine (EANM) guideline recommends DMSA imaging for children with recurrent or atypical UTIs and emphasizes pediatric-specific dosing to minimize radiation exposure (Vali, 2022).

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Pediatric Acute Gastroenteritis (PEDAB-6)

Guideline

Pediatric Acute Gastroenteritis (PEDAB-6)
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Pediatric Acute Gastroenteritis (PEDAB-6)

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Criteria

- Advanced imaging is considered not medically necessary for pediatric individuals with acute gastroenteritis unless there is clinical concern for diagnosis other than acute gastroenteritis. See specific symptom/diagnosis sections listed below.
- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary when abdominal red flag signs or symptoms are present, as listed in **General Guidelines (PEDAB-1.0)**.
- Additional imaging studies will depend on the specific symptoms. See the following sections for additional imaging guidelines:
  - **Generalized Abdominal Pain (PEDAB-2)** in the Pediatric Abdomen Imaging Guidelines
  - **Right Lower Quadrant Pain (PEDAB-3)** in the Pediatric Abdomen Imaging Guidelines
  - **Right Upper Quadrant Pain (PEDAB-8)** in the Pediatric Abdomen Imaging Guidelines
  - **Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis (PEDAB-9)** in the Pediatric Abdomen Imaging Guidelines
  - **Constipation, Diarrhea, and Irritable Bowel Syndrome (PEDAB-12)** in the Pediatric Abdomen Imaging Guidelines
  - **Abdominal Mass (PEDAB-13)** in the Pediatric Abdomen Imaging Guidelines
  - **Left Upper Quadrant (PEDAB-25)** in the Pediatric Abdomen Imaging Guidelines
  - **Intussusception (PEDAB-27)** in the Pediatric Abdomen Imaging Guidelines
  - **Bowel Obstruction (PEDAB-28)** in the Pediatric Abdomen Imaging Guidelines
  - **Left Lower Quadrant Pain (PEDAB-29)** in the Pediatric Abdomen Imaging Guidelines

Evidence Discussion

Radiologic imaging has a minimal role in the evaluation of pediatric acute gastroenteritis because the diagnosis is primarily clinical. Most children present with dehydration, vomiting, and diarrhea, and recover with supportive care. When symptoms follow this typical pattern, imaging does not add diagnostic value (Hammershaimb, 2024).

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When red flag features are present, evidence supports contrast-enhanced CT of the abdomen and pelvis as the appropriate imaging modality. Examples include severe focal abdominal pain, concern for obstruction, or complications that cannot be evaluated adequately by examination or ultrasound. In these settings, CT clarifies alternative diagnoses and detects complications that mimic gastroenteritis, enabling timely intervention (Hammershaimb, 2024).

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Hematuria (PEDAB-7)

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Hematuria (PEDAB-7)
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Hematuria (PEDAB-7)

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Criteria

Hematuria is a relatively common complaint in pediatric individuals, and imaging considerations differ from those occurring in adult individuals.

- Ultrasound Kidneys (CPT® 76770 or CPT® 76775) and bladder (CPT® 76856 or CPT® 76857) are considered medically necessary for asymptomatic gross hematuria or microscopic hematuria with proteinuria present.
- Imaging is considered not medically necessary for isolated asymptomatic microscopic hematuria without proteinuria on initial evaluation.
  - When isolated microscopic hematuria is identified, urinalysis should be repeated on at least two additional occasions over a 1-to 2-month period to distinguish transient from persistent hematuria.
  - If hematuria persists (present on at least 2 of 3 urinalyses), renal and bladder ultrasound is considered medically necessary for further evaluation.
- For painful hematuria and no recent trauma, ANY of the following studies is considered medically necessary:
  - CT Abdomen and Pelvis without contrast (CPT® 74176)
  - Ultrasound kidneys (CPT® 76770 or CPT® 76775)
  - Ultrasound bladder (CPT® 76856 or CPT® 76857)
- For hematuria in the setting of recent trauma, the following study is considered medically necessary:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- CT Cystography (CT Pelvis with bladder contrast; CPT® 72193) is considered medically necessary when gross hematuria is present and pelvic fracture or traumatic bladder injury is suspected.
- 3-D reconstruction (CPT® 76377 or CPT® 76376) is considered medically necessary, if requested, for surgical planning.

Evidence Discussion

The ACR Appropriateness Criteria® designate renal and bladder ultrasound as the initial test for pediatric hematuria because it evaluates renal size, parenchymal echogenicity, hydronephrosis, and bladder pathology without ionizing radiation and can identify actionable abnormalities, including obstructive uropathy, congenital anomalies, and mass lesions (Dillman et al., 2018).

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Contemporary pediatric imaging reviews support ultrasound as the safest and most informative initial imaging study for pediatric individuals because of its ability to identify structural causes of hematuria without radiation exposure (Viteri et al., 2020). In contrast, isolated asymptomatic microscopic hematuria without proteinuria is frequently transient and is rarely associated with clinically significant structural abnormalities. As a result, repeat urinalysis is recommended to distinguish transient from persistent hematuria before imaging is pursued (Viteri et al., 2020). The presence of accompanying proteinuria, persistent microscopic hematuria, gross hematuria, or other concerning clinical findings increases the likelihood of underlying renal pathology and supports further imaging evaluation.

In suspected renal or urinary tract injury, contrast-enhanced CT of the abdomen and pelvis is the standard imaging modality for evaluation of solid organ injury, vascular involvement, and urinary extravasation. When gross hematuria occurs in the setting of pelvic fracture or suspected bladder rupture, CT cystography provides additional assessment of bladder integrity. These imaging pathways reflect the superior sensitivity and anatomic detail provided by contrast-enhanced CT in trauma while accounting for the clinical consequences of missed injury (Viteri et al., 2020).

Three-dimensional reconstructions support operative or interventional planning when detailed vascular or collecting system anatomy will alter the procedure. This is an adjunct to the primary cross-sectional exam and should be used when it changes management decisions (Viteri et al., 2020).

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Right Upper Quadrant Pain (PEDAB-8)

Guideline

Right Upper Quadrant Pain (PEDAB-8)
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Right Upper Quadrant Pain (PEDAB-8)

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Criteria

- The presence of any red flag findings per **General Guidelines (PEDAB-1.0)** precludes adjudication based on any other criteria.
- Right upper quadrant pain imaging indications in pediatric individuals are very similar to those for adult individuals. See: **Abdominal Pain (AB-2)** in the Abdomen Imaging Guidelines.
  - Ultrasound Abdomen (CPT® 76700) and/or Nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226 or CPT® 78227) are considered medically necessary for initial evaluation of the following:
    - suspected acute cholecystitis or acalculous cholecystitis (symptoms may include RUQ pain with fever, elevated white blood cell count, or a positive Murphy sign)
    - suspected gallstones and bile duct obstruction (symptoms may include RUQ pain, absence of fever, normal white blood cell count)
    - ultrasound results are not needed prior to nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226 or CPT® 78227)
  - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) is considered medically necessary when either ultrasound or nuclear medicine imaging findings are equivocal.
  - In individuals with complaints of RUQ pain without fever and an ultrasound shows only gallstones, MRI Abdomen without contrast (CPT® 74181), MRI Abdomen without and with contrast (CPT® 74183), or Nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226 or CPT® 78227) are considered medically necessary to exclude other sources of pain.

Evidence Discussion

Hepatobiliary scintigraphy plays an established role in the evaluation of right upper quadrant pain (RUQ) in pediatric individuals when biliary pathology is suspected and ultrasound does not provide sufficient diagnostic clarity. The ACR-SPR Practice Parameter describes the high diagnostic accuracy of hepatobiliary scintigraphy for acute cholecystitis through identification of cystic duct obstruction. This is particularly relevant in pediatric individuals because acalculous cholecystitis occurs more frequently than in adults and may lack characteristic ultrasound findings (Gerard et al., 2021).

Scintigraphy also provides functional assessment of gallbladder filling and emptying, which may assist in the evaluation of biliary dyskinesia and other functional disorders in pediatric individuals with persistent RUQ pain and normal or nondiagnostic ultrasound

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findings. In addition, scintigraphy may demonstrate abnormal bile flow or bile leaks in postoperative or otherwise complex clinical situations. This evidence supports its use following nondiagnostic ultrasound findings and, in selected circumstances, as an initial imaging study when clinical suspicion for acute cholecystitis is high and ultrasound may not detect early or acalculous disease (Gerard et al., 2021).

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Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis (PEDAB-9)

Guideline

Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis (PEDAB-9)
References (PEDAB-9)

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Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis (PEDAB-9)

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Criteria

- Enterography is considered the medically necessary advanced imaging study for individuals with suspected or known inflammatory bowel disease (IBD).
  - MR Enterography (MRE) (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195) is generally preferred over CT when possible to avoid radiation exposure in pediatric individuals.

Children with Suspected Crohn's Disease

- MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), CT Enterography (CTE) (CPT® 74177), or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary for ANY of the following:
  - Evaluation of the severity and distribution of inflammatory changes
  - Identification of complications (e.g., fistulizing disease or abscess formation)
- MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195) or CT Enterography (CPT® 74177) is considered medically necessary for the evaluation of chronic abdominal pain associated with diarrhea and concern for inflammatory bowel disease if:
  - there is a positive family history of inflammatory bowel disease, **OR**
  - there are endoscopy or colonoscopy findings suggestive of inflammatory bowel disease, **OR**
  - elevated inflammatory markers (fecal lactoferrin greater than or equal to 4.0ug/g, CRP greater than 0.5mg/dL, or fecal calprotectin greater than or equal to 50ug/g), **OR**
  - diagnosis is still in doubt after colonoscopy and evaluation of inflammatory markers, and Crohn’s disease is suspected.
- MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195) or CT Enterography (CPT® 74177) is considered medically necessary prior to endoscopy if requested by or in consultation with the physician who will be performing the endoscopy.
- MRI Pelvis with contrast (CPT® 72196) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for the following:
  - Concern for perianal fistula or abscess

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- See: **IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)** in the Abdomen Imaging Guidelines for additional information regarding serologic markers

Children with Established IBD

- MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), CT Enterography (CPT® 74177), or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary for ANY of the following:
  - Monitoring response to disease-modifying treatment on an annual basis or when treatment change is being considered
  - Monitoring postoperative recurrence
  - New or worsening symptoms
  - Suspected complications including abscess, perforation, fistula, or obstruction
- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if requested (instead of CTE or MRE) for ANY of the following:
  - New or worsening symptoms
  - Suspected complications including abscess, perforation, fistula, or obstruction
- MRI Pelvis with contrast (CPT® 72196) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for the following:
  - Concern for perianal fistula or abscess

Background and Supporting Information

Children with suspected Crohn's disease may present with clinical features including weight loss, loose stools, vomiting, and intermittent abdominal pain. Small bowel imaging can provide important anatomic and inflammatory information related to the presence, severity, extent, and complications of Crohn's disease, which may assist in treatment planning and disease monitoring. Initial diagnostic evaluation typically includes laboratory assessment and upper and lower endoscopy (Stein et al., 2024).

Evidence Discussion

Imaging is integral to the evaluation and management of pediatric Crohn's disease, both at initial diagnosis and during longitudinal disease monitoring. In children with suspected IBD, imaging complements endoscopy by defining disease extent, identifying small bowel involvement, and detecting complications such as strictures, fistulas, and abscesses (Stein et al., 2024). Selection of imaging modality is guided by diagnostic performance, safety considerations, and the need for repeated assessment over time.

Magnetic resonance enterography (MRE) is the preferred cross-sectional imaging modality for suspected and established Crohn's disease in pediatric individuals. The ACR Appropriateness Criteria® support MRE due to its high sensitivity for active inflammation, ability to assess transmural disease, and absence of ionizing radiation

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(Moore et al., 2022). Meta-analytic data demonstrate that MRE performs well in the detection of pediatric IBD and provides excellent evaluation of deep bowel segments and extraluminal complications (He et al., 2022). These findings support the use of enterography as the preferred advanced imaging approach for both initial evaluation and ongoing disease assessment.

In children with established Crohn's disease, imaging supports therapeutic monitoring, assessment of treatment response, evaluation of disease progression, and detection of complications such as penetrating disease, abscess formation, or bowel obstruction.

When enterography protocols are unavailable, contraindicated, or not tolerated, MRI of the abdomen and pelvis may provide an alternative cross-sectional imaging option for evaluation of disease activity and complications. CT enterography may also be appropriate when rapid evaluation is required or MRI is not feasible, although radiation exposure should be considered when selecting imaging modalities for pediatric individuals (Moore et al., 2022).

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Abdominal Sepsis (Suspected Abdominal Abscess) (PEDAB-10)

Guideline

Abdominal Sepsis (Suspected Abdominal Abscess) (PEDAB-10)

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Abdominal Sepsis (Suspected Abdominal Abscess) (PEDAB-10)

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- Abdominal sepsis imaging indications in pediatric individuals are identical to those for adult individuals.
  - See: **Abdominal Sepsis (Suspected Abdominal Abscess) (AB-3)** in the Abdomen Imaging Guidelines.

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Postoperative Pain within 60 Days Following Abdominal Surgery (PEDAB-11)

Guideline

Postoperative Pain within 60 Days Following Abdominal Surgery (PEDAB-11)
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Postoperative Pain within 60 Days Following Abdominal Surgery (PEDAB-11)

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Criteria

- Any of the following studies are considered medically necessary in individuals with suspected postoperative complications (e.g., bowel obstruction, abscess, or anastomotic leak):
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705)
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
  - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - Because MRI may not be practical for the timely evaluation of postoperative abscesses, MRI should only replace CT when the study can be completed in a similar time frame as CT.
- Radiopharmaceutical nuclear medicine imaging (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, CPT® 78830, CPT® 78831, or CPT® 78832) is considered medically necessary for evaluation of any of the following:
  - Peritonitis
  - Postoperative fever without localizing signs or symptoms
- For evaluation of pain beyond 60 days postoperatively, see: **Generalized Abdominal Pain (PEDAB-2)**.

Evidence Discussion

Imaging is central to the evaluation of suspected postoperative abdominal complications in pediatric individuals, including obstruction, abscess formation, and anastomotic leak, particularly when clinical findings are nonspecific. The ACR supports selecting imaging modalities based on diagnostic needs, clinical urgency, and radiation considerations (American College of Radiology et al., 2021).

Contrast-enhanced CT provides rapid, comprehensive assessment of bowel obstruction, intra-abdominal fluid collections, and perforation, making it well suited for urgent postoperative evaluation. However, CT use should follow pediatric radiation dose optimization principles (Chang et al., 2020; American College of Radiology et al.,

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2021). MRI offers a radiation-free alternative with high soft tissue contrast for detecting abscesses and inflammatory changes, but its use depends on timely availability and individual stability (Greene et al., 2024). Ultrasound may identify fluid collections and facilitate image-guided intervention but has limitations in the evaluation of deep or complex intra-abdominal pathology.

In individuals with postoperative fever or suspected peritonitis without a clearly identified source, radiopharmaceutical imaging may help detect occult infection or inflammation when conventional anatomic imaging findings are inconclusive. This evidence supports the selective use of nuclear medicine imaging in nonlocalizing clinical presentations (American College of Radiology et al., 2021).

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Constipation, Diarrhea, and Irritable Bowel Syndrome (PEDAB-12)

Guideline

Constipation, Diarrhea, and Irritable Bowel Syndrome (PEDAB-12)
References (PEDAB-12)

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Constipation, Diarrhea, and Irritable Bowel Syndrome (PEDAB-12)

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Criteria

- Constipation associated with additional signs or symptoms:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary when any red flag signs or symptoms are present (as listed in **General Guidelines (PEDAB-1.0)**)
  - Clinical suspicion of tethered cord, tumor, or traumatic injury (e.g., abnormal physical findings over the spine, abnormal neurological exam, or symptoms refractory to provider-directed treatment for at least 3 months), see: **Spinal Dysraphism and Tethered Cord (PEDSP-4)** in the Pediatric and Special Populations Spine Imaging Guidelines.
- Diarrhea associated with additional signs or symptoms:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary when any red flag signs or symptoms are present (as listed in **General Guidelines (PEDAB-1.0)**).
  - See: **Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis (PEDAB-9)** for concerns regarding suspected inflammatory bowel disease.
- Irritable bowel syndrome associated with additional signs or symptoms:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary when any red flag signs or symptoms are present (as listed in **General Guidelines (PEDAB-1.0)**).
- Hirschsprung disease:
  - MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary postoperatively in individuals who have signs of complications related to treatment to assess the position of the pulled-through bowel, the sphincter muscles, and the area of the posterior urethra.

Evidence Discussion

Most pediatric individuals with constipation, diarrhea, or IBS do not require imaging because these conditions are usually functional and can be evaluated through clinical history, growth assessment, and targeted laboratory testing. Functional constipation and IBS are diagnosed clinically using symptom-based criteria and do not benefit from routine imaging because imaging rarely alters management or improves clinical outcomes (Maqbool & Liacouras, 2024; Webster et al., 2024).

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Imaging is reserved for pediatric individuals with refractory constipation, red flag symptoms, or chronic diarrhea when structural disease or inflammatory processes are suspected. North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) guidance identifies warning signs such as severe abdominal distention, persistent vomiting, delayed meconium passage, faltering weight (failure to thrive), and abnormal neurologic examination findings as indications for targeted imaging that evaluates for obstruction, motility disorders, or anatomic malformations (Kilgore et al., 2025; Quitadamo et al., 2024). In these scenarios, abdominal radiographs may assess stool burden or bowel obstruction; however, imaging does not establish a diagnosis of functional gastrointestinal disorders and should be used selectively.

In pediatric individuals with chronic diarrhea or clinical features concerning for inflammatory bowel disease, stool studies, inflammatory markers, and endoscopic evaluation guide diagnosis. Cross-sectional imaging is reserved for suspected IBD or disease-related complications and is not indicated for the routine evaluation of functional diarrhea. Evidence reviews of pediatric IBD demonstrate that MRI and ultrasound are preferred imaging modalities for the evaluation of inflammatory bowel pathology because of their diagnostic performance and lack of ionizing radiation exposure (Bouhuys et al., 2023; Thapar & Srivastava, 2024).

The available evidence does not support routine CT imaging for functional constipation, functional diarrhea, or irritable bowel syndrome in the absence of red flag findings. These data support limiting advanced imaging to individuals with concerning clinical features or suspected organic disease (Kilgore et al., 2025; Bouhuys et al., 2023).

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Abdominal Mass (PEDAB-13)

Guideline

Abdominal Wall Mass (PEDAB-13.1)
Intra-Abdominal Mass (PEDAB-13.2)
References (PEDAB-13)

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Abdominal Wall Mass (PEDAB-13.1)

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Criteria

- For initial imaging of a newly discovered abdominal wall mass, ANY of the following studies are considered medically necessary:
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705)
  - MRI Abdomen without contrast (CPT® 74181) or MRI Abdomen without and with contrast (CPT® 74183)
  - MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) may be added to MRI Abdomen when the mass is located below the umbilicus.
- If ultrasound and/or MRI findings are inconclusive or insufficient for preoperative planning, ANY of the following studies are considered medically necessary:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen without contrast (CPT® 74150)
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen and Pelvis without contrast (CPT® 74176) when the mass is located below the umbilicus.

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Intra-Abdominal Mass (PEDAB-13.2)

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Criteria

- Ultrasound Abdomen (CPT® 76700) is considered medically necessary as the initial imaging study for pediatric individuals with an intra-abdominal mass.
  - Abdominal ultrasound with Doppler imaging (CPT® 93975) is considered medically necessary to evaluate vascular supply.
- Additional imaging studies are determined based on ultrasound findings and depend on the location and organ involvement associated with the mass as well as clinical history, physical examination, and laboratory findings. See the following sections for additional imaging guidelines:
  - **General Guidelines (PEDONC-1)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Pediatric Lymphomas (PEDONC-5)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Neuroblastoma (PEDONC-6)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Pediatric Renal Tumors (PEDONC-7)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Pediatric Germ Cell Tumors (PEDONC-10)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Pediatric Liver Tumors (PEDONC-11)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Pediatric Adrenocortical Carcinoma (PEDONC-14)** in the Pediatric and Special Populations Oncology Imaging Guidelines
  - **Liver Lesion Characterization (PEDAB-15)**
  - **Adrenal Lesions (PEDAB-17)**
  - **Indeterminate Renal Lesion (PEDAB-19)**
  - **Spleen (PEDAB-26)**

Evidence Discussion

Imaging evaluation of pediatric abdominal masses follows a structured approach guided by clinical presentation and the suspected anatomic origin of the lesion. Ultrasound is a preferred initial modality because it can distinguish cystic from solid lesions, evaluate vascularity with Doppler imaging, and often identify the organ of origin while avoiding radiation and sedation (Birkemeier, 2020; Kim et al., 2022). These features support

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its use as a first-line tool for both intra-abdominal and abdominal wall masses and for assessing vascular supply.

These characteristics support the use of ultrasound as the initial imaging study for both intra-abdominal and abdominal wall masses, including assessment of vascular supply. MRI is also appropriate during the initial or early stages of evaluation when additional lesion characterization is needed or when the extent of disease and relationships to adjacent structures require further assessment. This is particularly relevant for abdominal wall masses that extend beyond the superficial tissues or when preoperative planning is anticipated (Kim et al., 2022).

MRI provides superior soft tissue contrast without ionizing radiation and is therefore preferred for lesion characterization, local staging, and surgical planning. Additional imaging is reserved for situations in which ultrasound and/or MRI findings are inconclusive or insufficient to guide management decisions. CT is used selectively when evaluation of calcifications, vascular anatomy, metastatic disease, or other features would alter clinical management, or when MRI is unavailable, contraindicated, or not feasible (Allen-Rhoades & Steuber, 2021).

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Renovascular Hypertension and Other Secondary Causes of Hypertension (PEDAB-14)

Guideline

Renovascular Hypertension and Other Secondary Causes of Hypertension (PEDAB-14)
References (PEDAB-14)

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Renovascular Hypertension and Other Secondary Causes of Hypertension (PEDAB-14)

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Criteria

- Clinical evaluation for suspected hypertension should include repeated blood pressure measurements (generally requires three or more measurements).
  - Trained health care professionals in the office setting should make a diagnosis of hypertension (HTN) if a child or adolescent has auscultatory-confirmed blood pressure (BP) readings at or above the 95th percentile at three different visits.

For Children Aged 1 year to younger than 13 years	For Children Aged 13 years or older
Normal BP: <90th Percentile	Normal BP: <120/<80 mm Hg
Elevated BP: ≥90th percentile to <95th percentile or 120/80 mm Hg to <95th percentile (whichever is lower)	Elevated BP: 120/<80 to 129/<80 mm Hg
Stage 1 HTN: ≥95th percentile to <95th percentile + 12 mmHg, or 130/80 to 139/89 mm Hg (whichever is lower)	Stage 1 HTN: 130/80 to 139/89 mm Hg
Stage 2 HTN: ≥95th percentile + 12 mm Hg, or ≥140/90 mm Hg (whichever is lower)	Stage 2 HTN: ≥140/90 mm Hg

- ANY of the following studies are considered medically necessary for the initial evaluation of a pediatric individual with suspected secondary hypertension:
  - Doppler or Duplex Ultrasound (CPT® 93975 or CPT® 93976)
  - Complete retroperitoneal Ultrasound (CPT® 76770)
  - Captopril renography (CPT® 78709) is not routinely used in current clinical practice and has largely been replaced by computed tomography angiography (CTA) and magnetic resonance angiography (MRA) of the abdomen. However,

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captopril renography may be considered medically necessary in unusual clinical circumstances when deemed appropriate for further evaluation.

Other considerations for imaging evaluation:

- CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) is considered medically necessary for pediatric individuals with hypertension to exclude fibromuscular dysplasia or other blood-flow restricting lesions of the renal arteries and suprarenal aorta.
- Pediatric individuals with high clinical suspicion for renin-mediated hypertension should undergo additional imaging whether Doppler US findings are positive or negative due to poor sensitivity for detecting distal intrarenal or accessory renal artery stenosis. CTA Abdomen (CPT® 74175) has high sensitivity and specificity and is considered medically necessary in these individuals.
- Echocardiography (CPT® 93306) is considered medically necessary at initial evaluation to screen for cardiac abnormalities, coarctation of the aorta, and end-organ damage such as left ventricular hypertrophy.
- Nuclear renal imaging (CPT® 78707, CPT® 78708, or CPT® 78709) is considered medically necessary for evaluation of the following:
  - Severe hypertension with progressive renal insufficiency or failure to respond to three-drug antihypertensive therapy
  - Malignant or accelerated hypertension
  - Acute worsening of previously stable hypertension
  - Diastolic BP greater than 100 mm Hg in an individual younger than 35 years of age
  - New onset severe hypertension
  - Hypertension in presence of asymmetric kidneys
  - Hypertension in the setting of acute elevation in creatinine, either unexplained or occuring after treatment with angiotensin-converting enzyme (ACE) inhibitor
  - Abdominal bruit
  - Recurrent acute pulmonary edema and hypertension
  - Hypokalemia with normal or elevated plasma renin level in absence of diuretic therapy
  - Hypertension with known neurofibromatosis

Evidence Discussion

Imaging evaluation for suspected renovascular hypertension in pediatric individuals should follow confirmation of elevated blood pressure using standardized measurement techniques and should be guided by the degree of clinical suspicion for renovascular disease (Flynn et al., 2017; Lee & Cho, 2025).

Ultrasound with Doppler is the preferred initial imaging modality, as it evaluates renal size asymmetry and hemodynamic indicators of renal artery stenosis without exposure

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to ionizing radiation. However, its sensitivity is limited in younger children and in individuals with branch vessel or distal renal artery disease, warranting further imaging when clinical suspicion remains high despite negative or inconclusive ultrasound findings (de Oliveira Campos et al., 2021; Lee & Cho, 2025).

Computed tomography angiography (CTA) and magnetic resonance angiography (MRA) provide definitive vascular assessment. CTA offers high spatial resolution and excellent diagnostic performance compared with conventional angiography, whereas MRA avoids ionizing radiation and may be preferred when radiation minimization is a priority. However, evaluation of smaller branch vessels may be more limited with MRA (Fleury et al., 2021; Expert Panel on Urological Imaging et al., 2026).

Nuclear renal imaging provides functional assessment by evaluating differential renal function and the physiologic impact of suspected renovascular disease when anatomic imaging findings are inconclusive (ACR–ACNM–SPR, 2022; Santos & Ferreira, 2024). These findings support the selective use of nuclear medicine studies in pediatric individuals with severe hypertension, declining renal function, suspected renovascular disease, or inconclusive vascular imaging findings.

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References (PEDAB-14)

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Liver Lesion Characterization (PEDAB-15)

Guideline

Liver Lesion Characterization (PEDAB-15)
References (PEDAB-15)

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Liver Lesion Characterization (PEDAB-15)

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Criteria

- High-risk individuals:
  - Prematurity
  - Low birth weight
  - Underlying chronic liver disease
  - Beckwith-Wiedemann syndrome
  - Familial adenomatous polyposis
  - Trisomy 18
  - Portosystemic shunts
  - Aicardi syndrome
  - Hereditary tyrosinemia
  - Bile salt export pump deficiency
- Pediatric-specific imaging considerations include:
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary as the initial imaging study in pediatric individuals.
  - MRI is preferred over CT when feasible to minimize radiation exposure in pediatric individuals.
- Liver lesion discovered on Ultrasound:
  - Any high-risk individual
    - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160)
  - Indeterminate liver lesion less than 3cm
    - Contrast-Enhanced US (CEUS, CPT® 76978, CPT® 76979)
    - If the lesion remains indeterminate or not fully characterized after Contrast-Enhanced US or if Contrast-Enhanced US is not available:
      - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160)
  - Indeterminate liver lesion greater than 3cm
    - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160)
- Liver lesion discovered on CT (non-contrast or single-contrast) or non-contrast MRI
  - Indeterminate Liver Lesion less than 3cm

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        - Contrast-Enhanced US (CEUS, CPT® 76978, CPT® 76979)
        - If the lesion remains indeterminate or not fully characterized after Contrast-Enhanced US or if Contrast-Enhanced US is not available:
            - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160)
    - Indeterminate Liver Lesion greater than 3cm
        - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160)
- For the imaging of specific focal liver lesions:
    - Suspected hepatic adenoma:
        - CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary every 6 months for 2 years, and then annually, to establish any growth patterns and assess for malignant transformation.
    - Hepatic Hemangioma
        - Limited Ultrasound Abdomen in 6-12 months
            - If stable or decreasing in size: Continue surveillance imaging every 6-12 months until 2 years. After 2 years, no further follow-up imaging is considered medically necessary unless it becomes symptomatic.
            - If increasing in size: Repeat imaging in 3-6 months or consider biopsy
            - See below for pre-operative considerations
    - Focal Nodular Hyperplasia (FNH):
        - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary to confirm a diagnosis of FNH. The use of Eovist contrast is often diagnostic in differentiating FNH from other lesions seen on MRI or CT.
        - Additional follow-up is limited abdominal US in 6-12 months
            - If stable or decreasing in size: Continue surveillance imaging every 6-12 months until 2 years. After 2 years, no further follow-up imaging is considered medically necessary unless it becomes symptomatic.
            - In adolescent females diagnosed with FNH who continue oral contraceptive use: Additional follow-up with annual US for 2 to 3 years is recommended. Follow-up with CT or MRI is considered medically necessary if the lesion is not adequately visualized on US.
            - If increasing in size: Repeat imaging in 3-6 months or consider biopsy
    - Hepatic cysts:
        - Asymptomatic, simple cysts
            - Limited Ultrasound Abdomen in 6-12 months

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        - If stable or decreasing in size: Continue surveillance imaging every 6-12 months until 2 years. After 2 years, no additional follow-up imaging is considered medically necessary unless it becomes symptomatic.
        - If increasing in size: Repeat imaging in 3-6 months or consider biopsy
    - For complicated cysts (US shows internal septations, fenestrations, calcifications, irregular walls, as well as the presence of daughter cysts):
        - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary
- Additional scenarios and follow-up imaging for an indeterminate lesion:
    - Indeterminate lesion less than 1cm in high-risk individuals detected on US, CT, or unenhanced MRI and not otherwise addressed in the guidelines above:
        - If **biopsy cannot be performed**, follow-up MRI is considered medically necessary at 3-6 months.
        - Additional imaging in this setting can be considered on an individual basis.
        - This timeframe would also apply if the lesion is indeterminate and an MRI with Eovist is requested for further evaluation.
- Nuclear medicine liver imaging (ONE of the following CPT® codes: CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215, or CPT® 78216) is considered medically necessary for the following when ultrasound, CT, and MRI are unavailable or contraindicated:
    - Evaluation of liver mass, trauma, or suspected focal nodular hyperplasia (FNH)
    - Differentiation of hepatic hemangioma from FNH
    - Evaluation of diffuse hepatic disease or elevated liver function tests
    - Suspected accessory spleen (CPT® 78215 or CPT® 78216 only)

Background and Supporting Information

- For liver lesions in children, it is important to differentiate between benign incidental versus malignant lesions.

Risk factors for malignant liver tumors in children

Hepatoblastoma	Hepatocellular carcinoma
◦ Prematurity	◦ Liver cirrhosis
◦ Low birth weight	◦ Chronic hepatitis B and C
◦ BWS and other overgrowth syndromes	◦ Hereditary tyrosinemia
◦ Familial adenomatous polyposis	◦ Portosystemic shunts
◦ Trisomy 18	◦ Bile salt export pump deficiency

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Hepatoblastoma	Hepatocellular carcinoma
◦ Portosystemic shunts	
◦ Aicardi syndrome	

Evidence Discussion

Ultrasound is the preferred initial imaging modality for pediatric liver lesions, as studies demonstrate it reliably characterizes lesion morphology and vascularity while avoiding radiation and sedation (Hadian, 2024; Karmazyn, 2022).

MRI is preferred for cross-sectional evaluation because it provides superior tissue characterization and hepatobiliary phase imaging, which improves differentiation of benign and malignant lesions compared with CT (Moreira-Silva et al., 2022; Rees et al., 2025). These findings support the use of MRI as the preferred advanced imaging modality in pediatric individuals whenever feasible to minimize radiation exposure.

For lesions less than 3cm, contrast-enhanced ultrasound (CEUS) provides real-time assessment of arterial and portal venous enhancement patterns, improving differentiation among hemangioma, focal nodular hyperplasia (FNH), and atypical cystic lesions without radiation exposure or sedation. CEUS may reduce the need for immediate cross-sectional imaging, although MRI or CT remains appropriate when CEUS is unavailable or when lesion characterization remains indeterminate (Ro et al., 2025; Moreira-Silva et al., 2022).This evidence supports the use of CEUS as an intermediate step for characterization of smaller indeterminate lesions identified on ultrasound, CT, or noncontrast MRI.

Lesions greater than 3cm are associated with an increased likelihood of neoplastic pathology, including hepatoblastoma and hepatic adenoma. MRI with hepatobiliary contrast improves differentiation of FNH, adenoma, and malignant tumors, while CT remains an acceptable alternative when MRI is unavailable, contraindicated, or not feasible (Rees et al., 2025; Karmazyn et al., 2022). These findings support direct progression to cross-sectional imaging for larger indeterminate lesions.

Hepatic adenomas warrant interval cross-sectional imaging because of the potential risks of growth, hemorrhage, and malignant transformation, particularly in adolescents and individuals with metabolic risk factors (Scheers, 2024). FNH often demonstrates characteristic hepatobiliary phase uptake on MRI, supporting diagnosis and allowing transition to ultrasound-based surveillance after lesion characterization is complete, with closer follow-up in higher-risk individuals (Ro et al., 2025). Ongoing estrogen exposure may influence lesion behavior and has been associated with interval growth in some individuals, supporting short-term surveillance in adolescents who continue oral contraceptive therapy (Scheers et al., 2024; Ro et al., 2025).

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Infantile hemangiomas and simple hepatic cysts are frequently stable and may be followed with ultrasound surveillance unless interval growth or atypical imaging features are identified (Karmazyn et al., 2022; Moreira-Silva et al., 2022).

Pediatric individuals with tumor predisposition syndromes, such as Beckwith–Wiedemann spectrum, require earlier and more sensitive imaging evaluation for hepatoblastoma and other solid tumors. Surveillance guidelines support the use of cross-sectional imaging—preferably MRI, with CT as an alternative—when lesions are detected on screening ultrasound to enable accurate characterization and guide management (Kalish et al., 2024; Rees et al., 2025).

For indeterminate lesions smaller than 1 cm in high-risk individuals, short-interval follow-up imaging may be appropriate because early characterization can be limited by lesion size. MRI surveillance allows assessment for interval growth or evolution of imaging characteristics that may warrant further evaluation or intervention (Kalish et al., 2024; Rees et al., 2025).

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Liver Disease (PEDAB-16)

Guideline

Pediatric Liver Failure and Cirrhosis (PEDAB-16.1)
References (PEDAB-16.1)
Biliary Disease (PEDAB-16.2)
References (PEDAB-16.2)
Liver Elastography (PEDAB-16.3)
References (PEDAB-16.3)

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Pediatric Liver Failure and Cirrhosis (PEDAB-16.1)

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Criteria

- Elevated liver function testing imaging indications in pediatric individuals are similar to those for adult individuals. See: **Abnormal Liver Chemistries (AB-30)** in the Abdomen Imaging Guidelines.
- Causes of liver failure or cirrhosis in pediatric individuals are different from adults, and are frequently idiopathic, but commonly due to ONE of the following:
  - Biliary dysfunction (e.g., biliary atresia, cystic fibrosis-related hepatobiliary disease)
  - Metabolic disease
  - Post-infectious
- Liver ultrasound (CPT® 76700) with duplex Doppler (CPT® 93975) is considered medically necessary as the initial imaging study prior to approving CT or MRI for pediatric individuals.
  - MRI Abdomen without and with contrast (CPT® 74183) is considered medically necessary when ultrasound findings are inconclusive or technically limited and is generally preferred over CT when feasible to minimize radiation exposure.
- Repeat liver ultrasound (CPT® 76705) with duplex Doppler (CPT® 93975 or CPT® 93976) is considered medically necessary in pediatric individuals in ANY of the following circumstances:
  - Annual surveillance of known chronic liver dysfunction or cirrhosis of any cause
  - New or worsening findings on history, physical exam, or laboratory results that suggest progression of liver disease
  - Clinical suspicion of portal venous congestion or portal hypertension
- Nuclear medicine liver imaging (ONE of the following CPT® codes: CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215, or CPT® 78216) is not routinely used, but is considered medically necessary when ultrasound, CT, and MRI are unavailable or contraindicated for:
  - Diffuse hepatic disease or elevated liver function tests

Evidence Discussion

Pediatric individuals with chronic liver disease and cirrhosis are at risk for progressive portal hypertension, vascular complications, and focal hepatic lesions. Ultrasound with Doppler imaging is the preferred initial and surveillance imaging modality because it is noninvasive, readily repeatable, and provides both anatomic and hemodynamic

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information, including portal vein patency, flow direction, splenomegaly, and ascites, which are important indicators of disease progression and decompensation (Squires & Balistreri, 2024; Hadian et al., 2024). These characteristics support its role in longitudinal surveillance in a population that often requires repeated imaging evaluation.

MRI, including magnetic resonance angiography (MRA) and magnetic resonance cholangiopancreatography (MRCP) when indicated, is appropriate for further characterization and staging when ultrasound findings are indeterminate or when complications such as focal hepatic lesions, biliary abnormalities, or vascular shunts are suspected. The absence of ionizing radiation is particularly important in pediatric individuals with chronic liver disease and cirrhosis, in whom repeated imaging may be necessary over time (Squires & Balistreri, 2024; Napolitano et al., 2021).

CT of the abdomen with intravenous contrast remains an appropriate alternative when MRI is unavailable, contraindicated, or not feasible, particularly for evaluation of complications, vascular anatomy, and liver transplant planning. Collectively, the evidence supports an ultrasound-first approach with selective use of MRI or CT based on clinical findings and the need for additional anatomic characterization.

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Biliary Disease (PEDAB-16.2)

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Criteria

- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary as the initial imaging study.
  - Advanced imaging, such as CT or MRI, is rarely considered medically necessary unless otherwise indicated below.
- After initial ultrasound:
  - If biliary atresia is suspected:
    - Hepatobiliary system imaging (HIDA scan) is considered medically necessary if requested by the surgeon before liver biopsy.
  - If choledochal cyst is suspected:
    - CT Abdomen with contrast (CPT® 74160) or MRI/MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary.
    - For preoperative assessment: MRI/MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary.
  - If primary biliary disease such as primary sclerosing cholangitis or primary biliary cholangitis is suspected:
    - CT Abdomen with contrast (CPT® 74160) or MRI/MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary.
- Follow-up of resected choledochal cysts (types I and IV, and type V not treated by transplantation):
  - Immediately after resection:
    - Ultrasound Abdomen (CPT® 76700 or CPT® 76705) AND MRI Abdomen with cholangiography (CPT® 74183) is considered medically necessary.
  - Years 1-20 post-resection:
    - Ultrasound Abdomen (CPT® 76700 or CPT® 76705), biannually
      - MRI Abdomen with cholangiography (CPT® 74183) is considered medically necessary on an every 3-year schedule (in lieu of ultrasound) for any of the following:
        - Ultrasound is not feasible due to body habitus
        - Ultrasound is unavailable
  - Years 21-40 post-resection:
    - Ultrasound Abdomen (CPT® 76700 or CPT® 76705), every 3 years

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- MRI Abdomen with cholangiography (CPT® 74183) is considered medically necessary on an every 4-year schedule (in lieu of ultrasound) for any of the following:
  - Ultrasound is not feasible due to body habitus
  - Ultrasound is unavailable

◦ Residual cystic tissue is present following resection:
  ▪ Ultrasound Abdomen (CPT® 76700 or CPT® 76705), annually

Background and Supporting Information

The definition of conjugated hyperbilirubinemia is a serum conjugated bilirubin level greater than 1mg/dL if total bilirubin is less than 5.0mg/dL, or a conjugated bilirubin level greater than 20% of the total bilirubin level when the total bilirubin level is greater than 5.0 mg/dL. Obstructive causes of liver disease should be evaluated. Additional laboratory testing may include total and fractionated bilirubin, AST, ALT, alkaline phosphatase, GGT, and/or urinalysis.

Evidence Discussion

In neonatal and infantile cholestasis, early differentiation of biliary atresia from other causes is critical because outcomes are time-dependent. Ultrasound is the first imaging step due to its availability, lack of radiation, and ability to assess gallbladder morphology, biliary dilation, and associated hepatic findings. Imaging must be interpreted in conjunction with laboratory results and the timing of jaundice onset to guide rapid triage (Fawaz et al., 2017; Napolitano et al., 2021).

When ultrasound is inconclusive, MRI with MRCP is appropriate to provide high-resolution delineation of the biliary tree and liver parenchyma without radiation exposure. Hepatobiliary scintigraphy (HIDA) is reserved for cases where functional biliary excretion must be demonstrated, particularly when biliary atresia remains a concern after initial evaluation. Evidence supports its use within a multidisciplinary diagnostic pathway rather than as a standalone or first-line study, especially given the need for timely surgical decision-making for Kasai portoenterostomy (Fawaz et al., 2017; Napolitano et al., 2021; ACR–ACNM–SNMMI–SPR, 2025).

Choledochal cysts require precise anatomic characterization before surgery and structured long-term surveillance, as ongoing malignancy risk has been reported even after resection (Koea et al., 2022). MRCP is the preferred imaging modality for both preoperative planning and post-resection follow-up because it provides detailed ductal mapping without radiation and supports repeated imaging over time. When MRCP is not feasible, contrast-enhanced CT is an acceptable alternative for defining biliary and vascular anatomy.

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Liver Elastography (PEDAB-16.3)

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Criteria

- The following are considered medically necessary for initial staging of liver fibrosis in individuals with suspected chronic liver disease:
  - Transient Elastography or Vibration-Controlled Transient Elastography (VCTE, e.g., Fibroscan) (CPT® 91200) is considered the preferred initial imaging modality.
  - Magnetic Resonance Elastography (MRE, CPT® 76391) is considered medically necessary for ANY of the following:
    - Transient Elastography failure despite use of an XL-probe, OR
    - BMI greater than or equal to 30kg/m² OR
    - Conflict between clinical picture and transient elastography results

Evidence Discussion

Assessment of hepatic fibrosis is important for risk stratification and monitoring in pediatric chronic liver disease. Transient elastography, including vibration-controlled transient elastography (VCTE), provides a noninvasive, radiation-free estimate of liver stiffness and is an appropriate initial imaging modality because it correlates with fibrosis severity while allowing serial assessment without the risks associated with liver biopsy (Squires & Balistreri, 2024; Hadian et al., 2024).

Magnetic resonance elastography (MRE) provides reliable assessment of liver stiffness when transient elastography is unsuccessful, limited by obesity or body habitus, or when elastography findings are inconsistent with the overall clinical presentation. These characteristics support the selective use of MRE when additional fibrosis characterization is needed (Squires & Balistreri, 2024; Hadian et al., 2024).

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Adrenal Lesions (PEDAB-17)

Guideline

Adrenal Lesions (PEDAB-17)
References (PEDAB-17)

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Adrenal Lesions (PEDAB-17)

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Criteria

- Indications for imaging evaluation of adrenal lesions in pediatric individuals are similar to those in adult individuals. For additional indications not specifically addressed below, refer to **Adrenal Cortical Lesions (AB-16)** in the General Abdomen Imaging Guidelines.
- Abdominal Ultrasound is considered medically necessary as the initial imaging study for adrenal masses in infants and pediatric individuals.
  - If an adrenal mass is detected, short interval follow-up retroperitoneal ultrasound (CPT® 76770) is considered medically necessary when performed seven or more days after the initial examination.
    - If repeat ultrasound is concerning for neuroblastoma or there is high clinical concern for neuroblastoma, MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170) are considered medically necessary to confirm the diagnosis.
    - If these studies confirm neuroblastoma ^{123}I-Metaiodobenzylguanidine (MIBG) scintigraphy is considered medically necessary for disease staging.
  - For ongoing management of neuroblastoma, See: **Neuroblastoma (PEDONC-6)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Additional adrenal imaging considerations include the following:
  - Adrenal Nuclear Imaging of the cortex and/or medulla (CPT® 78075) is considered medically necessary for the following:
    - Distinguishing adrenal adenoma from adrenal hyperplasia.
    - Evaluation of suspected pheochromocytoma or paraganglioma.
      - MIBG is preferred (ONE of the following CPT® codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804).
      - For known pheochromocytoma or paraganglioma, see: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines.
    - Evaluation of suspected neuroblastoma, ganglioneuroblastoma, or ganglioneuroma.
      - MIBG is preferred (ONE of the following CPT® codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804 or hybrid SPECT/CT CPT® 78830, CPT® 78831, or CPT® 78832), see: **Neuroblastoma (PEDONC-6)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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- History of multiple endocrine neoplasia syndromes: See **Multiple Endocrine Neoplasias (MEN) (PEDONC-2.8)** in the Pediatric and Special Populations Oncology Imaging Guidelines
- History of neurofibromatosis: See **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines
- History of von Hippel-Lindau disease: See **Von Hippel-Lindau Syndrome (VHL) (PEDONC-2.10)** in the Pediatric and Special Populations Oncology Imaging Guidelines

Evidence Discussion

In neonates and young children, adrenal masses most commonly represent adrenal hemorrhage or neuroblastoma, so imaging focuses on accurate differentiation while minimizing radiation exposure. Ultrasound is the preferred first-line imaging modality because it reliably characterizes suprarenal masses, detects adrenal hemorrhage, and avoids ionizing radiation. Short-interval follow-up ultrasound is appropriate when findings are consistent with adrenal hemorrhage to document the expected evolution of hemorrhage and identify persistent or atypical findings that warrant additional evaluation (Hryhorczuk & Paltiel, 2021; Zaki et al., 2025).

When ultrasound findings are indeterminate or suggest neoplasm, MRI is preferred for further characterization due to its ability to distinguish hemorrhage, necrosis, fat, and adjacent soft tissue involvement without radiation exposure. CT remains appropriate when MRI is unavailable, when rapid evaluation is required for surgical planning, or when detection of calcifications, a common feature of neuroblastoma, will affect diagnosis (Zaki et al., 2025; Ozcan et al., 2021).

If imaging findings are concerning for neuroblastoma or other neuroendocrine tumors, iodine-123 metaiodobenzylguanidine (^{123}I-MIBG) scintigraphy is valuable for staging and treatment planning because it can identify functional and metastatic disease beyond that detected by anatomic imaging. Functional imaging also has an important role in the evaluation of suspected pheochromocytoma and paraganglioma, particularly when multifocal or metastatic disease is suspected (Sánchez-Vañó et al., 2025; Nölting et al., 2021). In endocrine-active adrenal disorders, biochemical confirmation is generally recommended before localization imaging to reduce false-positive findings and unnecessary procedures (Fleseriu et al., 2021; Adler et al., 2025).

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Hemochromatosis (PEDAB-18)

Guideline

Hereditary (Primary) Hemochromatosis (PEDAB-18.1)
Transfusion-Associated (Secondary) Hemochromatosis (PEDAB-18.2)
References (PEDAB-18)

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Hereditary (Primary) Hemochromatosis (PEDAB-18.1)

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- Hereditary hemochromatosis imaging indications in pediatric individuals are identical to those for adult individuals. See: **Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases (AB-11.2)** in the Abdomen Imaging Guidelines.

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Transfusion-Associated (Secondary) Hemochromatosis (PEDAB-18.2)

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Criteria

- The following studies are considered medically necessary for evaluation of transfusion-associated hemochromatosis:
  - MRI Abdomen without contrast (CPT® 74181) for liver iron evaluation AND/OR MRI Cardiac without contrast (CPT® 75557) for cardiac iron evaluation **OR**
  - MRI Chest without contrast (CPT® 71550) for combined cardiac and hepatic iron evaluation and may be approved as a single-study alternative to MRI Abdomen without contrast (CPT® 74181) and MRI Cardiac without contrast (CPT® 75557).
- Screening MRI is considered medically necessary every 12 months for chronically transfused individuals at risk of hemochromatosis.
- Imaging is considered medically necessary every 3 months for treatment response in individuals receiving active treatment (chelation and/or phlebotomy).

Evidence Discussion

Pediatric individuals with sickle cell disease, thalassemia, bone marrow failure syndromes, prior malignancy, or transplant exposure frequently accumulate excess iron after repeated transfusions. Annual MRI surveillance supports early detection of hepatic and cardiac iron deposition before symptoms develop and aligns with hematology and survivorship recommendations that emphasize noninvasive longitudinal monitoring in transfusion-dependent populations (Brandow et al., 2020; Devine et al., 2025).

Chelation therapy and phlebotomy alter iron balance over time. MRI approximately every 3 months during active treatment allows assessment of hepatic iron concentration and myocardial T2* recovery, supporting dose adjustment and reducing the risk of undertreatment or overtreatment (Reeder et al., 2023).

When validated protocols are used, a non-contrast chest MRI can acquire cardiac T2* alongside upper abdominal T2*/R2* measurements in a single session. This approach reduces sedation exposure, avoids duplicative imaging, and maintains accuracy when protocols are properly calibrated (Reeder et al., 2023).

Cumulative iron burden correlates with transfusion exposure. Iron overload becomes increasingly likely after repeated transfusions, particularly in individuals with hemoglobinopathies or bone marrow failure syndromes, supporting MRI-based surveillance in high-risk populations (Brandow et al., 2020; Devine et al., 2025).

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Indeterminate Renal Lesion (PEDAB-19)

Guideline

Indeterminate Renal Lesion (PEDAB-19)
References (PEDAB-19)

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Indeterminate Renal Lesion (PEDAB-19)

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Criteria

- Indeterminate renal lesion characterization imaging indications in pediatric individuals are similar to those for adult individuals. See: **Indeterminate Renal Lesion (AB-35)** in the Abdomen Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) is considered medically necessary in symptomatic pediatric individuals with simple cysts when surgical intervention is being considered.
  - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170) is considered medically necessary for pediatric individuals with complex renal cysts identified on ultrasound.
  - For individuals with congenital anomalies, nuclear medicine studies with diuretic renography (CPT® 78708 or CPT® 78709) are considered medically necessary to evaluate renal function and cystography to determine presence of associated reflux.
  - Individuals with solid renal masses, see: **Pediatric Renal Tumors (PEDONC-7)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
  - Individuals with renal tumor predisposition syndromes, see: **Other Renal Cell Cancer Predisposition Syndromes (PEDONC-2.17)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Evidence Discussion

Most indeterminate renal lesions in pediatric individuals are cysts or congenital anomalies rather than malignancies, consistent with the lower risk of malignant progression and supporting a conservative, ultrasound-first approach (Thomas et al., 2021; Gimpel et al., 2019). Evidence indicates that most simple renal cysts can be managed without additional imaging unless clinical or sonographic concerns arise (Dell & Hartung, 2024).

Simple cysts typically do not require cross-sectional imaging; however, in symptomatic individuals undergoing evaluation for potential surgical intervention, imaging is appropriate to define anatomy and exclude atypical features that would alter management. MRI is preferred to minimize radiation exposure, while CT is reserved for cases requiring rapid assessment or evaluation of calcification (Dell & Hartung, 2024; Thomas et al., 2021).

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Complex features on ultrasound, including septations, nodularity, or solid components, warrant contrast-enhanced MRI or CT to assess enhancement and stratify risk using a modified Bosniak framework validated in pediatric populations, guiding management and surgical consultation (Peard et al., 2022; Gimpel et al., 2019).

In pediatric individuals with suspected congenital urinary tract anomalies, functional assessment is an important component of evaluation. Consensus recommendations support diuretic renography for assessment of differential renal function and urinary drainage, while cystography remains necessary to evaluate for associated vesicoureteral reflux (ACR–ACNM–SPR, 2022; Bar-Sever et al., 2022; Majd et al., 2018).

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Hydronephrosis (PEDAB-20)

Guideline

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Hydronephrosis (PEDAB-20)

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Criteria

Hydronephrosis is a relatively common finding in pediatric individuals, with the following imaging considerations:

- Retroperitoneal ultrasound (CPT® 76771) is considered medically necessary for evaluation of antenatal hydronephrosis (AHN)
  - Postnatal ultrasound is considered medically necessary in the neonatal period, preferably within the first 24 hours of life, for males with a distended bladder or infants with moderate/severe antenatal hydronephrosis diagnosed prenatally.
  - Postnatal ultrasound performed after seven days of life is considered medically necessary for infants with mild prenatal hydronephrosis.
  - A second postnatal ultrasound, even if initial is normal, at 4 to 6 weeks of age is considered medically necessary for all infants with antenatal hydronephrosis.
  - After this, infants with known hydronephrosis may be followed by ultrasound every 3 to 12 months until resolution of hydronephrosis.
    - This imaging represents a guideline-supported, scheduled follow-up imaging evaluation, as described in **Clinical Information (Preface-3.1)** in the Preface Imaging Guidelines.
- Voiding cystourethrogram (VCUG) (CPT® 74455) is considered medically necessary in newborn male individuals with a history of antenatal hydronephrosis to evaluate for vesicoureteral reflux (VUR) and posterior urethral valves (PUV).
- Hydronephrosis associated with urinary tract infection or vesicoureteral reflux, see: **Urinary Tract Infection (UTI) (PEDAB-5)** for imaging guidelines.
- In individuals with obstructive uropathy (including ureteropelvic junction obstruction (UPJO), ureterovesical junction obstruction (UVJO), and bladder outlet obstruction), retroperitoneal ultrasound (CPT® 76770) and diuretic renography (CPT® 78707, CPT® 78708, or CPT® 78709) are considered medically necessary for preoperative planning and postoperatively at 3 to 12 months.
  - If hydronephrosis has resolved on postoperative imaging, no further routine imaging is considered medically necessary.
- Magnetic resonance urography (MRU) (CPT® 74183 and CPT® 72197) is considered medically necessary when ultrasound and diuretic renography are inconclusive.
- CT Abdomen with contrast (CPT® 74160) is considered medically necessary when ultrasound is inconclusive and a vascular cause of ureteropelvic junction obstruction (UPJO) is suspected.

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Evidence Discussion

Imaging evaluation of infants with suspected urinary tract dilation or obstruction should prioritize diagnostic accuracy while minimizing ionizing radiation. Ultrasound is the first-line imaging modality for antenatal and postnatal hydronephrosis, as it reliably assesses renal dilation and urinary tract anatomy without radiation exposure (Brown et al., 2020; Darge & Siegel, 2019). The ACR Appropriateness Criteria® support ultrasound as the initial study, with follow-up and additional imaging guided by risk stratification and clinical progression (Brown et al., 2020; Nguyen et al., 2022). Serial ultrasound is appropriate for surveillance, as mild dilation may resolve with normal neonatal physiologic changes (Di Carlo & Crigger, 2024).

Voiding cystourethrogram (VCUG) is an important adjunctive imaging modality in the postnatal evaluation of infants with antenatal hydronephrosis when there is concern for vesicoureteral reflux (VUR) or lower urinary tract obstruction. The American Urological Association (AUA) guideline recommends evaluation for VUR in neonates and infants with prenatally diagnosed hydronephrosis, with VCUG serving as the gold standard diagnostic test for identifying reflux (Peters et al., 2010/2017). VCUG is typically performed following initial postnatal ultrasound when findings suggest increased risk, including moderate to severe hydronephrosis, ureteral dilation, abnormal bladder findings, or clinical history of urinary tract infection (Brown et al., 2020). In newborn male individuals, VCUG is particularly important for the identification of posterior urethral valves, a clinically significant obstructive cause of hydronephrosis that is not reliably detected by ultrasound alone and requires early diagnosis to prevent renal damage.

When ultrasound findings are indeterminate or suggest obstruction, further evaluation is warranted. Diuretic renography provides valuable information regarding urinary drainage and differential renal function, allowing distinction between obstructive and nonobstructive dilation. (Nguyen et al., 2022; Di Carlo & Crigger, 2024).

Magnetic resonance urography offers comprehensive anatomic and functional evaluation when ultrasound and renography findings remain inconclusive and may identify associated abnormalities not visible on ultrasound alone (Nguyen et al., 2022; Brown et al., 2020). Collectively, the available evidence supports a staged imaging approach using ultrasound as the initial study followed by VCUG, diuretic renography, or MR urography when clinically indicated (Brown et al., 2020; Chen et al., 2020).

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Polycystic Kidney Disease (PEDAB-21)

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Polycystic Kidney Disease (PEDAB-21)

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Criteria

- Abdominal ultrasound (CPT® 76700) or retroperitoneal ultrasound (CPT® 76770) is considered medically necessary for clinical concern of polycystic kidney disease, or for screening individuals who are at risk for autosomal dominant polycystic kidney disease (ADPKD).
- There are no established MRI-based diagnostic criteria for ADPKD in children younger than 15 years of age.
- For older children and teens, imaging indications for MRI Abdomen without contrast (CPT® 74181) would be identical to those for adult individuals. See: **Polycystic Kidney Disease (AB-38.1)** in the Abdomen Imaging Guidelines.

Evidence Discussion

Imaging is central to the evaluation of suspected polycystic kidney disease in pediatric individuals. Ultrasound is the first-line imaging modality for diagnosis and screening, as it reliably assesses kidney size, echogenicity, and cyst distribution without ionizing radiation (Gimpel et al., 2019; Devarajan, 2024).

Consensus guidelines emphasize that imaging findings reflect disease type. In autosomal recessive polycystic kidney disease (ARPKD), diffuse renal enlargement and increased echogenicity predominate, whereas evaluation of autosomal dominant polycystic kidney disease (ADPKD) focuses on cyst number and distribution (Gimpel et al., 2019). Ultrasound is sufficient for most pediatric evaluations, and routine CT is not recommended because it provides limited additional diagnostic benefit while exposing individuals to ionizing radiation.

MRI is not routinely required in children younger than 15 years of age because validated MRI-based diagnostic criteria for ADPKD have not been established in this population. In older children and adolescents, MRI may be used similarly to adults for further lesion characterization and risk stratification, particularly when assessment of total kidney volume may influence management decisions (Torres et al., 2025).

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Blunt Abdominal Trauma (PEDAB-22)

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Blunt Abdominal Trauma (PEDAB-22)

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- Blunt abdominal trauma imaging indications in pediatric individuals are identical to those for adult individuals. See: **Blunt Abdominal Trauma (AB-10.1)** in the Abdomen Imaging Guidelines.

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Hernias (PEDAB-23)

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- Hernia imaging indications in pediatric individuals are identical to those for adult individuals. See: **Hernias (AB-12)** in the Abdomen Imaging Guidelines.

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Abdominal Lymphadenopathy (PEDAB-24)

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Abdominal Lymphadenopathy (PEDAB-24)

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- Abdominal lymphadenopathy imaging indications in pediatric individuals are identical to those for adult individuals. See: **Abdominal Lymphadenopathy (AB-8)** in the Abdomen Imaging Guidelines.

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Left Upper Quadrant Pain (PEDAB-25)

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Left Upper Quadrant Pain (PEDAB-25)
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Left Upper Quadrant Pain (PEDAB-25)

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Criteria

- Left upper quadrant pain imaging indications in pediatric individuals are identical to those for adult individuals. See: **Abdominal Pain (AB-2)** in the Abdomen Imaging Guidelines.
- Nuclear medicine spleen imaging (CPT® 78185) is considered medically necessary for left upper quadrant pain when neither ultrasound nor CT is available.

Evidence Discussion

Ultrasound is the preferred initial modality for evaluating left upper quadrant pain in pediatric individuals, as it reliably assesses splenic size and focal lesions without radiation (Nadeem et al., 2021).

Cross-sectional imaging is reserved for cases in which ultrasound is inconclusive or complications are suspected. CT is most accurate for high-grade traumatic injury but should be used selectively due to radiation exposure, while MRI may assist in characterizing complex lesions (Nadeem et al., 2021).

Nuclear medicine spleen imaging provides functional assessment of splenic tissue and may identify infarction or accessory spleens. Although not routinely used, it is an appropriate alternative when ultrasound and CT are unavailable (ACR–ACNM–SNMMI–SPR, 2025).

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Spleen (PEDAB-26)

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Spleen (PEDAB-26)
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Spleen (PEDAB-26)

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Criteria

- Spleen imaging indications in pediatric individuals are very similar to those for adult individuals. See: **Spleen (AB-34)** in the Abdomen Imaging Guidelines.
- Nuclear medicine spleen imaging (CPT® 78185) is considered medically necessary for the following indications when CT is unavailable:
  - Splenic trauma
  - Evaluation of splenic function
  - Suspected splenic mass, cyst, abscess, infarct, or metastasis
  - Radiation treatment planning
  - Asplenia
  - Suspected functional accessory spleen:
    - CPT® 78215 or CPT® 78216 instead of CPT® 78185 is medically necessary, if requested
- Pediatric-specific imaging considerations include the following:
  - MRI is preferred over CT when possible to reduce radiation exposure.

Evidence Discussion

Ultrasound is the primary imaging modality for pediatric splenic evaluation, as it reliably demonstrates splenic size, echotexture, and focal lesions without radiation. It is generally sufficient for detecting splenomegaly, cysts, abscesses, and infarcts (Di Serafino et al., 2019; Navarro & Siegel, 2019). Pediatric imaging approaches are similar to those used in adults but place greater emphasis on minimizing radiation exposure (Remiker & Brandow, 2024b).

When additional characterization is needed, MRI is preferred for evaluating splenic parenchyma and indeterminate lesions without radiation, while CT is reserved for acute trauma requiring rapid assessment (Navarro & Siegel, 2019; Remiker & Brandow, 2024a).

Nuclear medicine spleen imaging provides functional assessment and may identify hyposplenism, infarction, or accessory spleens, and is appropriate when anatomic imaging is unavailable or insufficient (Remiker & Brandow, 2024a).

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Intussusception (PEDAB-27)

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Intussusception (PEDAB-27)
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Intussusception (PEDAB-27)

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Criteria

- Intussusception, defined as telescoping of one bowel loop into another, is a common cause of acute abdominal pain in young children and may be associated with bloody stool.
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary as the initial imaging study if there is a strong suspicion for intussusception.
  - CT Abdomen and/or Pelvis with contrast (CPT® 74160 or CPT® 74177) is considered medically necessary to help characterize or diagnose pathologic lead points identified on ultrasound.

Evidence Discussion

Ultrasound is the preferred initial imaging modality for suspected pediatric intussusception because it provides rapid, radiation-free evaluation with consistently high diagnostic accuracy. Meta-analyses report sensitivities and specificities exceeding 95% when performed by experienced pediatric sonographers, reflecting the reliability of characteristic findings such as the transverse target sign and longitudinal pseudokidney sign, which directly depict telescoped bowel segments (Li et al., 2021; Rahmani et al., 2023).

Point-of-care ultrasound extends this capability to early triage, with trained providers demonstrating high diagnostic performance and reduced time to intervention (Lin Martore et al., 2022). Formal ultrasound remains the reference standard when further characterization is required, particularly to assess bowel wall viability or identify a pathologic lead point (Maqbool & Liacouras, 2024).

CT has a limited role in the routine evaluation of pediatric intussusception because ultrasound provides excellent diagnostic performance without radiation exposure. However, CT is appropriate when ultrasound findings suggest a pathologic lead point requiring further anatomic characterization, particularly in atypical presentations or older children (Maqbool & Liacouras, 2024).

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Bowel Obstruction (PEDAB-28)

Guideline

Bowel Obstruction (PEDAB-28.1)
References (PEDAB-28)

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Bowel Obstruction (PEDAB-28.1)

ABP.BO.0028.1.A
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Criteria

- Suspected high-grade obstruction
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary (preferred to avoid unnecessary radiation exposure).
    - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if MRI is not readily available.
- Suspected intermittent or low-grade small bowel obstruction
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is considered medically necessary (preferred to avoid unnecessary radiation exposure).
    - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary if MRI is not readily available.
  - If the etiology or level of suspected intermittent or low-grade small bowel obstruction remains undetermined and additional imaging is needed after CT Abdomen and Pelvis, the following are considered medically necessary:
    - CT Enteroclysis (CPT® 74176 or 74177), or
    - CT Enterography (CPT® 74177), or
    - MR Enteroclysis (CPT® 74183 and CPT® 72197), or
    - MR Enterography (CPT® 74183 and CPT® 72197)
- Small bowel obstruction suspected to be secondary to Crohn's Disease
  - See: **Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis (PEDAB-9)**

Evidence Discussion

When cross-sectional imaging is required for suspected pediatric small bowel obstruction, MRI of the abdomen and pelvis without and with contrast is preferred for both high-grade and intermittent or low-grade obstruction because it defines transition points, bowel wall edema, perfusion, and complications without ionizing radiation, consistent with pediatric risk reduction principles (Hull et al., 2022). This supports its use as the primary modality when available and feasible. In high-grade obstruction, MRI provides comprehensive assessment of obstruction severity, etiology, and signs of ischemia or closed-loop physiology. CT with contrast remains appropriate when MRI is not readily available or when rapid evaluation is required due to clinical instability (Expert Panel on Gastrointestinal Imaging, 2020). In intermittent or low-

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grade obstruction, MRI improves detection of subtle transition points, adhesions, and inflammatory causes. When the level or etiology remains indeterminate after CT, targeted techniques such as CT or MR enterography or enteroclysis are appropriate to further characterize partial obstruction, with modality selection guided by availability and the need to minimize radiation exposure (Hull et al., 2022; Expert Panel on Gastrointestinal Imaging, 2020).

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Left Lower Quadrant Pain (PEDAB-29)

Guideline

Left Lower Quadrant Pain (PEDAB-29)
References (PEDAB-29)

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Left Lower Quadrant Pain (PEDAB-29)

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Criteria

Diverticulitis is the most common cause of left lower quadrant pain in adults but is extremely rare in pediatric individuals.

- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary when any red flag signs or symptoms are present (as listed in **General Guidelines (PEDAB-1.0)**)
- In the absence of red flag signs or symptoms, advanced imaging is rarely helpful in the initial evaluation of these individuals.
  - Pelvic ultrasound (CPT® 76856) is considered medically necessary as the initial imaging study of choice for detecting gynecologic abnormalities that may cause left lower quadrant pain in pediatric individuals.
  - For male individuals or if pelvic ultrasound is inconclusive, advanced imaging may be considered medically necessary as directed by gastroenterological evaluation or consultation.

Evidence Discussion

Diverticulitis is rare in children, and most cases of left lower quadrant pain reflect functional, infectious, or gynecologic conditions rather than colonic inflammation. Pediatric literature consistently notes that diverticular disease is uncommon before adolescence and often associated with underlying anatomic or genetic predispositions rather than routine presentations of abdominal pain (Maqbool & Liacouras, 2024; Han et al., 2024). This low prevalence supports restricting CT imaging to cases with clinical red flag features, where contrast-enhanced CT provides accurate evaluation of diverticulitis, its severity, complications, and alternative diagnoses. In the absence of red flags, advanced imaging has limited diagnostic yield. Pelvic ultrasound is the preferred initial study when a gynecologic source is suspected, given its diagnostic utility and lack of radiation. For male individuals, or when ultrasound is inconclusive, further imaging may be appropriate only when symptoms persist or clinical evaluation, including gastroenterology consultation, indicates the need for additional characterization. This approach aligns imaging intensity with disease likelihood while minimizing unnecessary radiation exposure.

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Celiac Disease (Sprue) (PEDAB-30)

Guideline

Celiac Disease (Sprue) (PEDAB-30)
References (PEDAB-30)

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Celiac Disease (Sprue) (PEDAB-30)

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- Celiac disease imaging indications in pediatric individuals are identical to those for adult individuals. See: **Celiac Disease (Sprue) (AB-24)** in the Abdomen Imaging Guidelines.

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Transplant (PEDAB-31)

Guideline

Transplant (PEDAB-31)

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Transplant (PEDAB-31)

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- Liver and kidney transplant imaging indications in pediatric individuals are identical to those for adult individuals. See: **Transplant (AB-42)** in the Abdomen Imaging Guidelines.
- For post-transplant lymphoproliferative disorder in pediatric individuals, see: **Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) (PEDONC-5.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Gaucher Disease (PEDAB-32)

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Gaucher Disease (PEDAB-32)

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Gaucher Disease (PEDAB-32)

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See: **Gaucher Disease (PEDPN-4)** in the Pediatric Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines.

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Vomiting Infant, Malrotation, and Hypertrophic Pyloric Stenosis (PEDAB-33)

Guideline

Vomiting Infant, Malrotation, and Hypertrophic Pyloric Stenosis (PEDAB-33)
References (PEDAB-33)

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Vomiting Infant, Malrotation, and Hypertrophic Pyloric Stenosis (PEDAB-33)

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Criteria

- Suspected malrotation is an indication for emergent imaging. If malrotation with mid-gut volvulus is suspected, Ultrasound Abdomen, limited (CPT® 76705) is considered medically necessary.
- Ultrasound Abdomen, limited (CPT® 76705) is considered medically necessary for infants with persistent projectile non-bilious vomiting.
  - If initial studies are not diagnostic, repeat studies are considered medically necessary (as frequently as daily) until the vomiting resolves or the diagnosis is made.

Background and Supporting Information

Vomiting in infants is generally classified as either bilious (implying obstruction distal to the Sphincter of Oddi) or non-bilious (Expert Panel on Pediatric Imaging et al., 2020; Bales & Liacouras, 2024).

Bilious vomiting may be a true emergency, as some of the conditions causing this could result in compromise of blood supply to the intestines, a potentially life-threatening situation (Bales & Liacouras, 2024; Yousef et al., 2025).

Hypertrophic Pyloric Stenosis is an idiopathic condition wherein the circular muscle controlling emptying of the stomach thickens causing a relative obstruction of the gastric outlet. The condition can occur at any age (including occasionally in adults), but the typical child is male, aged 2 to 6 weeks. Projectile non-bilious vomiting is the most common presenting complaint, but the description of projectile vomiting is subjective (Rich & Dolgin, 2021; Singh & Liacouras, 2024). The differential diagnosis for non-bilious vomiting includes common conditions such as viral gastroenteritis and gastro-esophageal reflux (Expert Panel on Pediatric Imaging et al., 2020; Singh & Liacouras, 2024).

Evidence Discussion

Imaging selection for infant vomiting is guided by clinical pattern of emesis and age-specific differential diagnoses (Expert Panel on Pediatric Imaging et al., 2020;

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Coley, 2019). In infants aged 2 to 8 weeks presenting with nonbilious projectile vomiting, ultrasound is the recommended initial imaging study of choice for suspected hypertrophic pyloric stenosis because it directly measures pyloric muscle thickness and channel length with high diagnostic accuracy (Expert Panel on Pediatric Imaging et al., 2020; Singh & Liacouras, 2024).

Systematic reviews and meta-analyses have demonstrated pooled sensitivities and specificities of 95% or greater when established diagnostic thresholds are applied, supporting ultrasound as a definitive first test, with physical examination findings adding limited incremental value when negative (van den Bunder et al., 2022; Rich & Dolgin, 2021). This performance reflects the clear anatomic changes in pyloric stenosis and supports reliance on ultrasound for confirmation.

Current pediatric and radiology practice references consistently prioritize ultrasound because it is readily available, does not expose infants to ionizing radiation, provides direct visualization of the pylorus, and demonstrates excellent reproducibility when performed by experienced operators (Expert Panel on Pediatric Imaging et al., 2020; Singh & Liacouras, 2024; Hwang, 2017).

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Pancreatitis (PEDAB-34)

Guideline

Acute Pancreatitis (PEDAB-34.1)
Chronic Pancreatitis (PEDAB-34.2)
References (PEDAB-34)

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Acute Pancreatitis (PEDAB-34.1)

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Criteria

- The presence of any red flag findings per **General Guidelines (PEDAB-1.0)** precludes adjudication based on any other criteria.
  - When red flag signs or symptoms are present, CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen with contrast (CPT® 74160), or MRI/MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary.
- Initial imaging
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary as the initial imaging study.
  - If ultrasound is performed and is nondiagnostic due to technical limitations (e.g., obesity, overlying bowel gas, etc.), or if ultrasound is negative but there is continued clinical suspicion of acute pancreatitis, MRI/MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary.
    - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) is considered medically necessary if MRI/MRCP cannot be performed.
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is considered medically necessary for management of acute pancreatitis in the following situations:
    - evaluation of known or suspected complications of acute pancreatitis
    - to characterize degree of organization of collections before intervention
- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) is considered medically necessary to follow known fluid collections for resolution or progression.
- Acute Recurrent Pancreatitis (ARP)
  - MRI/MRCP (CPT® 74183 or CPT® 74181) is considered medically necessary for the following:
    - to identify structural or obstructive causes
    - to assess for progression to chronic pancreatitis
  - In pediatric individuals who require sedation for imaging, it is reasonable to alternate MRI/MRCP with Ultrasound Abdomen (CPT® 76700 or CPT® 76705) or CT Abdomen with contrast (CPT® 74160) for serial monitoring of acute recurrent pancreatitis as recommended by or in consultation with a gastroenterologist or pancreatic specialist.

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Chronic Pancreatitis (PEDAB-34.2)

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Criteria

- The role of imaging is to contribute to or establish initial diagnosis, stage/monitor disease, assess for superimposed acute pancreatitis, identify potential etiologies of chronic pancreatitis, characterize secretory function, and/or plan for surgical intervention.
- If chronic pancreatitis is suspected, the following are considered medically necessary:
  - MRI Abdomen without and with contrast (CPT® 74183)
    - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) if MRI cannot be performed
- To evaluate suspected or known episodes of acute pancreatitis in a pediatric individual with chronic pancreatitis, the following is considered medically necessary:
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705)
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) or MRI/MRCP (CPT® 74183 or CPT® 74181) are considered medically necessary in the following situations:
    - If ultrasound is negative and imaging diagnosis of acute pancreatitis is needed
    - If planning endoscopic or surgical interventions

Evidence Discussion

Imaging in pediatric pancreatitis is guided by clinical severity, the presence of concerning features, and the need to identify an underlying cause. Ultrasound remains the initial modality because it detects gallstones, biliary dilation, and pancreatic enlargement without radiation or contrast exposure, supporting identification of common etiologies such as biliary obstruction (Trout et al., 2021a). However, when red flag findings or clinical deterioration are present, cross-sectional imaging is required to assess complications and alternative diagnoses. MRI with MRCP is preferred in stable individuals because it provides high-resolution evaluation of pancreatic inflammation, ductal anatomy, and peripancreatic collections without ionizing radiation, and is particularly useful when the etiology is unclear or structural abnormalities are suspected (Trout et al., 2021a; Trout et al., 2021b). CT with contrast is appropriate when rapid assessment is needed or MRI is not available, given its reliability in detecting necrosis, hemorrhage, and infected collections. This approach supports the use of either MRI/MRCP or contrast-enhanced CT in higher-risk presentations, while reserving modality selection for clinical urgency, patient stability, and resource availability (Trout et al., 2021b).

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Supplemental Material

Guideline

Procedure Codes Associated with Abdomen Imaging

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Procedure Codes Associated with Abdomen Imaging

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The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

MRI	**CPT®**
MRI Abdomen without contrast	74181
MRI Abdomen with contrast (rarely used)	74182
MRI Abdomen without and with contrast	74183
Unlisted MRI procedure (for radiation planning or surgical software)	76498
MRA	**CPT®**
MRA Abdomen	74185
CT	**CPT®**
CT Abdomen without contrast	74150
CT Abdomen with contrast	74160
CT Abdomen without and with contrast	74170
CT Abdomen and Pelvis without contrast	74176
CT Abdomen and Pelvis with contrast	74177
CT Abdomen and Pelvis without and with contrast	74178

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CT Guidance for Needle Placement (Biopsy, Aspiration, Injection, etc.)	77012
CT Guidance for and monitoring of Visceral Tissue Ablation	77013
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497
CTA	**CPT®**
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Criteria

Heart disease in the pediatric population involves predominantly congenital lesions. Pediatric individuals can have acquired heart disease unique to children. For those diseases which occur in both pediatric and adult populations, differences exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.

Pediatric Cardiac Imaging Appropriate Clinical Evaluation

- Prior to considering advanced imaging (CT, MR, Nuclear Medicine) or echocardiogram, a pertinent clinical evaluation should be performed, including **both** of the following:
  - A detailed history, physical examination, or meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging)
  - A review of appropriate diagnostic studies (laboratory, EKG, echocardiogram, and other diagnostic imaging)
- A recent clinical evaluation is not needed prior to advanced imaging (CT, MR, Nuclear Medicine) or echocardiogram if **any** of the following apply:
  - Individual is undergoing guideline-supported scheduled imaging evaluation.
  - Echocardiogram is being performed at the first cardiology visit for an appropriate indication as stated in these guidelines.
  - Routine imaging is anticipated at the next visit (e.g., one year follow-up echocardiogram for a 10 year old with a VSD).
- Advanced imaging of the heart and echocardiogram are considered medically necessary in any of the following:
  - Individuals who have documented active clinical signs or symptoms of disease involving the heart
  - As follow-up for findings on echocardiograms
- Repeat imaging studies of the heart are considered medically necessary when any of the following applies:
  - Repeat imaging is considered medically necessary in a specific guideline section.
  - There is evidence for progression of disease on imaging.
  - There is documentation describing how repeat imaging will affect treatment decisions for a new onset disease.

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- Asymptomatic individuals with exposure to cardiotoxic drugs can have serial echocardiograms as per **Cardiotoxicity and Echocardiography (PEDONC-19.2)** in the Pediatric Oncology Imaging Guideline.
- Advanced imaging and echocardiogram is considered **not** medically necessary, in the absence of other appropriate indications listed in these guidelines, for **any** of the following:
  - Individuals starting ADHD medications
  - To screen asymptomatic individuals for disorders involving the heart

Pediatric Cardiac Imaging Modality General Considerations

There are a number of variables that influence the modality and timing of imaging individuals with congenital heart disease, including gestational age, chronological age, physiologic effects of the defect, status of interventions (catheterization and surgical), rate of individual's growth, stability of the defect on serial imaging, comorbid conditions, and activity level, which results in a high degree of individuality in determining the schedule for imaging these individuals.

- MRI
  - MRI and MRA studies are frequently considered medically necessary for evaluation of congenital heart defects not well visualized on echocardiography, thoracic arteries and veins not visualized on echocardiography, cardiomyopathies, and right ventricular disease, as well as in follow-up for these indications.
  - Due to duration of MRI acquisition and the need to minimize individual movement, anesthesia is typically required for most infants (excluding neonates), young children (age <7 years), and older children with delays in development or maturity.
  - MRI protocols in this population should aim to minimize anesthesia exposure. When intravenous access is already established for anesthesia and there are no contraindications to contrast, performing MRI both without and with contrast is considered medically necessary to avoid repeat imaging and additional anesthesia if the non-contrast study is inconclusive. The use of gadolinium-based contrast agents should be carefully considered given evidence of deposition in the brain and other tissues.
- CT
  - CT is primarily used to evaluate the coronary and great vessels in congenital heart disease if cardiac MR is contraindicated. Studies may be limited to the region of interest, particularly for follow-up, to reduce radiation exposure.
  - Contrast use in the pediatric population should follow clinical indication. CT may be appropriate for further evaluation of findings on prior imaging or as specified in condition-based guidelines, but should not replace MRI solely to avoid sedation unless recommended. Coordination between the provider and imaging service may be necessary to determine the optimal study.

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- Ultrasound
  - Echocardiography is the primary modality used to evaluate the anatomy and function of the pediatric heart and is generally indicated before considering other imaging modalities.
- Nuclear Medicine
  - Multi Gated Acquisition (MUGA) studies (CPT® 78472, CPT® 78473, CPT® 78481, CPT® 78483, CPT® 78494, or CPT® 78496) are rarely performed in pediatrics but are considered medically necessary for the following:
    - In pediatric oncology when echocardiography is inconclusive or suboptimal (see: **Appropriate Clinical Evaluations (PEDONC-1.2)** for imaging guidelines)
    - Quantitation of left ventricular function when recent echocardiogram shows ejection fraction of <50% and MUGA results will impact acute patient care decisions
  - SPECT/CT fusion imaging involves SPECT (MPI) imaging and CT for optimizing location, accuracy, and attenuation correction combines functional and anatomic information.
    - There is currently no evidence-based data to formulate appropriateness criteria for SPECT/CT fusion imaging.
    - Combined use of nuclear imaging, including SPECT, along with diagnostic CT (fused SPECT/CT) is considered investigational.
  - Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete but are considered medically necessary when other preferred modalities are unavailable or non-diagnostic. Left ventricular ejection fraction can be obtained by echocardiogram, SPECT MPI, MUGA study, cardiac MRI, cardiac CT, or cardiac PET depending on the clinical situation, rather than by the non-imaging heart function study described by CPT® 78414.
  - Cardiac Shunt Detection (CPT® 78428) is rarely performed in pediatrics but is considered medically necessary for individuals in whom CMR is not diagnostic.
    - Calculation of left and right ventricular ejection fractions
    - Assessment of wall motion
    - Quantitation of right to left shunts
  - 99mTc-PYP Myocardial Imaging
    - See **Myocardial 99mTc-PYP Pyrophosphate Imaging in Cardiac Amyloidosis (CD-3.8)** in the General Cardiac Imaging Guidelines for identification of myocardial ATTR (transthyretin) amyloidosis.

Pediatric Age

For the purposes of these guidelines, pediatric age groups are defined as follows:

- **Neonate (Newborn)**: Birth through 28 days of age
- **Infant**: Birth through 12 months of age

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- **Pre-adolescent Child**: 1 year through 10 years of age
- **Adolescent**: 11 years through less than 19 years of age
- **Child**: 1 year through less than 19 years of age

Glossary

Acute Chest pain	Chest pain is new onset (<2 mo) or involves a change in pattern, intensity, or duration compared with previous episodes in an individual with recurrent symptoms
Acute Coronary Syndrome (ACS)	ACS (unstable angina, STEMI and NSTEMI) - sudden imbalance between myocardial oxygen consumption and demand, usually related to coronary artery obstruction, but includes other non-coronary artery origins such as acute coronary insufficiency (e.g., coronary embolism), hypotension, non-ischemic myocardial injury (e.g., myocarditis) and multifactorial causes that are not mutually exclusive (e.g., stress cardiomyopathy)
Adverse Pregnancy Outcomes (APO)	Adverse pregnancy outcomes (APOs) include myriad maternal or fetal complications, including hypertensive disorders of pregnancy (gestational hypertension, preeclampsia, eclampsia, and HELLP [hemolysis, elevated liver enzymes, low platelets] syndrome), placental abruption, spontaneous preterm birth, fetal growth restriction, and small-for-gestational-age infant
Agatston Score	A nationally recognized calcium score for the coronary arteries based on Hounsfield units and size (area) of the coronary calcium
Angina pectoris	Retrosternal chest discomfort that builds gradually in intensity (over several minutes), is usually precipitated by stress (physical or emotional) or occurring at rest (as in the case of an ACS) with characteristic radiation (e.g., left arm, neck, jaw) and its associated symptoms (e.g., dyspnea, nausea, lightheadedness). When actively treated (e.g., nitroglycerin) or spontaneously resolving (e.g., with rest), it dissipates over a few minutes

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Anginal variants or equivalents	Symptoms or pain at a site other than the chest occurring in an individual at high cardiac risk (i.e., known CAD, diabetes). Anginal equivalents have the same importance as angina pectoris and can present as dyspnea, diaphoresis, nausea, extreme fatigue, pain, pressure, tightness, or discomfort in shoulders, arms, neck, back, upper abdomen, or jaw not otherwise explained by another process.
ARVD/ARVC – Arrhythmogenic Right Ventricular Dysplasia/ Cardiomyopathy	A potentially lethal inherited disease with syncope and rhythm disturbances, including sudden death, as presenting manifestations
BNP	B-type natriuretic peptide, blood test used to diagnose and track heart failure (n-T-pro-BNP is a variant of this test)
Brugada Syndrome	An electrocardiographic pattern that is unique and might be a marker for significant life-threatening dysrhythmias
Chronic Coronary Syndrome	CAD that is chronic, often progressive, and is treatable with lifestyle adjustments, medications, and invasive interventions instituted to achieve disease stabilization or regression
Double Product (Rate Pressure Product)	An index of cardiac oxygen consumption, is the systolic blood pressure times heart rate, generally calculated at peak exercise; over 25000 means an adequate stress load was performed
Fabry Disease	An infiltrative cardiomyopathy, can cause heart failure and arrhythmias
Fatigue	A subjective feeling of weakness, tiredness or exhaustion. Exertional fatigue is acute in nature, with rapid onset, short duration, and short recovery period.
First-degree relative	A biological parent, sibling, or child of an individual
Hibernating myocardium	Viable but poorly functioning or non-functioning myocardium which likely could benefit from intervention to improve myocardial blood supply

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Major epicardial coronary arteries	The large, angiographically visible coronary arteries supplying the myocardium, including the left main, LAD, LCx, RCA, and clinically significant branch vessels >1.5 mm in diameter
NSTEMI (Non-ST Segment Myocardial Infarction)	Troponin rise/fall with ≥1 value >99th percentile without STEMI ECG criteria,
Optimized Medical Therapy	Should include (where tolerated) antiplatelet agents, calcium channel antagonists, partial fatty acid oxidase inhibitors (e.g., ranolazine), statins, short-acting nitrates as needed, long-acting nitrates up to 6 months after an acute coronary syndrome episode, beta blocker drugs (optional), angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blocking (ARB) agents (optional)
Platypnea	Shortness of breath when upright or seated (the opposite of orthopnea) and can indicate cardiac malformations, shunt or tumor
Risk factors for Cardiac Chest pain	Comorbidities that increase the risk of developing coronary artery disease such as age ≥65 y, diabetes, hypertension (i.e., stage 1 hypertension (130–139mm Hg systolic or 80–89mm Hg diastolic), or stage 2 hypertension (≥140mm Hg systolic or ≥90mm Hg diastolic), adverse pregnancy outcomes, family history of premature CAD (history of any direct blood relatives [parents, siblings, children]) who have had any of the following conditions at age 55 or younger for male relatives or age 65 or younger for female relatives: AMI, sudden cardiac death without obvious cause, CABG surgery, PCI, familial/genetic factors (includes genetic abnormalities leading to vasculopathies, aneurysmal disorders, cardiomyopathies, coagulopathies, and inherited dysrhythmia syndromes)
Silent ischemia	Absence of ischemic symptoms or signs prior to objective demonstration of ischemia by stress testing and/or demonstration of obstructive CAD

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Stable Chest Pain	Chest pain symptoms are chronic (≥2 mo) and associated with consistent precipitants such as exertion or emotional stress
STEMI (ST Segment Myocardial Infarction)	STEMI (ST Segment Myocardial Infarction): ECG: persistent ST-elevation meeting J-point criteria + troponin rise/fall above 99th percentile
Syncope	Loss of consciousness; near-syncope is not syncope
Takotsubo cardiomyopathy	Apical dyskinesis oftentimes associated with extreme stress and usually thought to be reversible
Troponin	A marker for ischemic injury, primarily cardiac
TAVR (TAVI)	A minimally invasive procedure to treat aortic valve disease
Unstable Angina	Ischemic symptoms at rest or with decreasing threshold, present <2 weeks, without STEMI ECG criteria and without troponin elevation.

Abbreviations used in the Cardiac Imaging Guidelines

Abbreviation	Description
ACC	American College of Cardiology
ACS	Acute coronary syndrome
AHA	American Heart Association
AMI	Acute myocardial infarction
ANOCA	Angina with no obstructive coronary artery disease
ASCOT	Anglo-Scandinavian Cardiac Outcomes Trial
ASD	Atrial septal defect
AVR	Aortic valve replacement
BMI	Body mass index

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Abbreviation	Description
BiVAD	Biventricular assist device
CABG	Coronary artery bypass grafting
CAC	Coronary artery calcium
CAD	Coronary artery disease
CAD-RADS 2	The Coronary Artery Disease Reporting and Data System
CHF	Congestive heart failure
CIED	Cardiac implantable electronic device
CMD	Coronary microvascular dysfunction
CMR	Cardiovascular magnetic resonance
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
CCTA	Coronary computed tomography angiography
CCT	Cardiac computed tomography
CTA	Computed tomography angiography
CTEPH	Chronic thromboembolic pulmonary hypertension
CTRCD	Cardiotoxic Agent/Cancer Therapeutics-Related Cardiac Dysfunction
CTV	Computed tomography venography
CV	Cardiovascular
EBCT	Electron beam computed tomography
ECP	External counterpulsation (also known as EECP)
ECG	Electrocardiogram

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Abbreviation	Description
ECP	External counterpulsation
ETT	Exercise treadmill stress test
FDG	Fluorodeoxyglucose, a radiopharmaceutical used to measure myocardial metabolism
FFR	Fractional flow reserve
HCM	Hypertrophic cardiomyopathy
HF	Heart failure
INOCA	Ischemia with no obstructive coronary artery disease
IV	Intravenous
LAD	Left anterior descending coronary artery
LCx	Left circumflex artery
LDL-C	Low density lipoprotein cholesterol
LHC	Left heart catheterization
LM	Left main coronary artery
LV	Left ventricle
LVAD	Left ventricular assist device
LVEF	Left ventricular ejection fraction
LVOT	Left ventricular outflow tract
MI	Myocardial infarction
MINOCA	Myocardial infarction with no obstructive coronary artery disease
MPI	Myocardial perfusion imaging (SPECT study, nuclear cardiac study)
MRA	Magnetic resonance angiography

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Abbreviation	Description
MRI	Magnetic resonance imaging
mSv	millisievert (a unit of radiation exposure) equal to an effective dose of a joule of energy per kilogram of recipient mass
MUGA	Multi gated acquisition scan of the cardiac blood pool
PCI	Percutaneous coronary intervention (includes percutaneous coronary angioplasty (PTCA) and coronary artery stenting)
PET	Positron emission tomography
PET MPI	PET myocardial perfusion imaging
PTCA	Percutaneous coronary angioplasty
RCA	Right coronary artery
RHC	Right heart catheterization
RVAD	Right ventricular assist device
SCAD	Spontaneous coronary artery dissection
SPECT	Single photon emission computed tomography
SPECT MPI	SPECT myocardial perfusion imaging
Stress-perfusion CMR	Stress-perfusion cardiovascular magnetic resonance (CMR)
Stress Echo	Stress echocardiography
TEE	Transesophageal echocardiogram
TAVI	Transcatheter aortic valve implantation
TAVR	Transcatheter aortic valve replacement
TIA	Transient Ischemic Attack
TTE	Transthoracic echocardiogram
VSD	Ventricular septal defect

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Background and Supporting Information

Individuals who are under 19 years of age should be imaged according to the Pediatric Cardiac Imaging Guidelines and the general Cardiac Imaging Guidelines. Individuals who are 19 years of age or older should be imaged according to the Cardiac Imaging Guidelines, except where directed otherwise by a specific guideline section. Adult individuals who also have congenital heart disease should be imaged by **Adult Congenital Heart Disease** in the general Cardiac Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount, and variance from these guidelines may be appropriate and warranted for specific clinical situations.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Congenital Heart Disease

Guideline

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Congenital Heart Disease General (PEDCD-2.1)

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Criteria

- MRA or CTA Chest is considered medically necessary when prior echocardiogram is equivocal or suboptimal regarding the aortic arch, pulmonary arteries or veins, or other thoracic issue.
- When both Cardiac MRI or CT Cardiac and MRA Chest or CTA Chest is considered medically necessary this is abbreviated as CMR/CCT/CCTA **and/or** MRA/CTA Chest in this guideline.
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest is considered medically necessary in place of a TTE when future echocardiograms are expected to be non-diagnostic or inconclusive due to a persistent anatomic or physiologic condition.

Age Definitions

For the purposes of these guidelines, pediatric age groups are defined as follows:

- **Neonate (Newborn)**: Birth through 28 days of age
- **Infant**: Birth through 12 months of age
- **Pre-adolescent Child**: 1 year through 10 years of age
- **Adolescent**: 11 years through less than 19 years of age
- **Child**: 1 year through less than 19 years of age

Pediatric or Children refers to all individuals from birth through less than 19 years of age.

Imaging considerations

- Newborns (neonates) the following special considerations are considered medically necessary.
  - TTE at any frequency when there are concerns for a ductal dependent lesion
  - TTE at any frequency when changes in pulmonary vascular resistance are suspected or known
  - One repeat TTE when a prior TTE is abnormal or equivocal (either in the hospital or as newborn outpatient)
- TTE is considered medically necessary in individuals with congenital heart disease when there is a **change in clinical status or new concerning signs or symptoms** including:
  - Shortness of breath

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  - Fatigue
  - Chest discomfort
  - Percentile weight loss
  - Weight gain
  - Poor feeding
  - Tachypnea
  - Tachycardia
  - CHF signs on exam
  - Change in EKG, Pulse ox, or laboratory values
- An additional TTE is considered medically necessary prior to the next routine interval study to assess for more rapid change when a change is identified on a surveillance TTE such as:
  - Increasing stenosis gradient
  - Increasing regurgitation amount
  - Increasing pulmonary vascular resistance
  - Decreased ventricular function
  - Change in ductal status
- Imaging with medication adjustments may require additional imaging at that time.
  - TTE is considered medically necessary when making dose adjustments (changing to the equivalent mcg/kg or mg/kg is not considered a dosing change for imaging).
  - More than one TTE is considered medically necessary to determine dose response in infants due to rapid growth in this age group, changing physiology, pulmonary vascular resistance, ductal size, and weight changes.
- Medically necessary imaging in heart surgery
  - TTE is considered medically necessary one month prior to heart surgery. Depending on lesion, MR/CT Cardiac and/or Chest may also be included.
  - TTE within one month post-operative
  - CMR or CCT if prior TTE is equivocal or suboptimal
- Individuals with pulmonary hypertension (PH) and congenital heart disease (CHD) are evaluated for both their congenital lesion and for PH.

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Congenital Heart Disease Coding and Modality Considerations (PEDCD-2.2)

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Criteria

Congenital Heart Disease imaging per modality (PEDCD-2.2.2)

Congenital Heart Disease Echocardiography Coding

- The following are common echocardiography code combinations used for re-evaluation of individuals with known congenital heart disease:
  - CPT® 93303, CPT® 93320, and CPT® 93325
  - CPT® 93304, CPT® 93321, and CPT® 93325
  - CPT® 93303
  - CPT® 93304
- CPT® 93306 is considered not medically necessary in the evaluation of known congenital heart disease.

Echocardiogram

Echocardiography is the primary imaging modality used for diagnosing and monitoring congenital heart disease and is generally required before other imaging modalities are considered unless otherwise stated in a specific guideline section.

- Transthoracic echocardiogram (TTE)
  - TTE for congenital cardiac anomalies; complete (CPT® 93303)
  - TTE for congenital cardiac anomalies; limited study (CPT® 93304)
  - TTE (2D) m-mode recording, complete, with spectral and color flow doppler echocardiography (CPT® 93306)
  - TTE (2D) with or without m-mode recording; complete (CPT® 93307)
  - TTE (2D) with or without m-mode recording; limited study (CPT® 93308)
- Transesophageal echocardiogram (TEE)
  - TEE (2D) including probe placement, imaging, interpretation, and report (CPT® 93312)
  - TEE for congenital cardiac anomalies; including probe placement, imaging, interpretation, and report (CPT® 93315)

MRI

CMR either without contrast or without and with contrast is considered medically necessary when a recent TTE is inconclusive, needs confirmation of findings, or

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does not completely define the disease (for subsequent follow-up studies, a recent echocardiogram is not a requirement).

MRI Cardiac (CMR) for velocity flow mapping is considered medically necessary when TTE is equivocal or suboptimal regarding valvular disease or when intracardiac blood flow studies are needed.

MRA Chest is considered medically necessary if TTE is equivocal or suboptimal when the aorta or pulmonary artery needs to be visualized beyond the root or if aortopulmonary collaterals, pulmonary veins, or systemic veins need to be visualized.

MRA Chest alone is considered medically necessary if the individual cannot cooperate with full cardiac MRI exam.

MRA Chest is considered medically necessary for assessment of the great arteries, pulmonary veins, and systemic chest veins when recent TTE is equivocal or suboptimal including the following issues:

- Coarctation of the aorta
- Tetralogy of Fallot
- Anomalous pulmonary veins
- Transposition of the great arteries
- Truncus arteriosus
- Vascular rings and other lesions of the great arteries

- MRI Cardiac (CMR)
  - MRI Cardiac for morphology and function without contrast (CPT® 75557)
  - MRI Cardiac for morphology and function without and with contrast (CPT® 75561)
  - MRI Cardiac for velocity flow mapping (List separately in addition to code for primary procedure) (CPT® 75565)
- MRI Chest
  - MRI Chest without contrast (CPT® 71550)
  - MRI Chest with contrast (CPT® 71551)
  - MRI Chest with & without contrast (CPT® 71552)
- MRI Angiography (MRA)
  - MRA Chest (excluding myocardium) with or without contrast (CPT® 71555)

CT

CT Chest is considered medically necessary when TTE is equivocal or suboptimal regarding determination of vascular extra-cardiac anatomy in individuals with complex congenital heart disease or pulmonary artery (PA) and pulmonary vein (PV) assessment.

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CTA Chest is considered medically necessary when TTE is equivocal or suboptimal regarding coarctation of the aorta, Tetralogy of Fallot, anomalous pulmonary veins and other lesions of the great arteries, and vascular rings.

CTA Cardiac (CCTA) is considered medically necessary when TTE is equivocal or suboptimal regarding coronary artery anomalies.

CT cardiac is considered medically necessary when TTE is equivocal or suboptimal regarding coronary structure and morphology.

- Cardiac (CCT)
  - CT, Heart, with contrast material, for evaluation of cardiac structure and morphology (CPT® 75572)
  - CT, Heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (CPT® 75573)
- CT Angiography-Cardiac (CCTA)
  - CTA Heart, coronary arteries and bypass grafts (when present), with contrast, including 3D image post processing (CPT® 75574)
- CT-Chest
  - CT Thorax without contrast (CPT® 71250)
  - CT Thorax with contrast (CPT® 71260)
  - CT Thorax without & with contrast (CPT® 71270)
- CT Angiography Chest (CTA Chest)
  - CTA Chest without and with contrast (CPT® 71275)

Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)

- Stress echo
  - Echocardiography (TTE), (2D), with or without m-mode, during rest and cardiovascular stress, with interpretation and report (CPT® 93350)
  - Echocardiography (TTE), (2D), m-mode, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation (CPT® 93351)
- Stress -perfusion CMR
  - Cardiac MRI for morphology and function without contrast, with stress imaging (CPT® 75559)
  - Cardiac MRI for morphology and function without and with contrast, with stress imaging (CPT® 75563)
- Myocardial perfusion imaging (MPI)
  - SPECT MPI CPT® 78451, 78452

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- PET MPI CPT® 78491, 78492, 78430, 78431, 78432, 78433

Pulmonary perfusion imaging

Pulmonary perfusion imaging is considered medically necessary in individuals with congenital heart disease or suspected congenital heart diseases when there are clinical questions regarding relative pulmonary blood flow,

- Pulmonary perfusion imaging (e.g., particulate) (CPT® 78580)
- Pulmonary ventilation (e.g., aerosol or gas) and perfusion imaging (CPT® 78582)

Cardiac Catheterization Procedure Codes

Codes	Cardiac Catheterization Procedures
93451-93464 93566-93568	Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
with bypass grafts	

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Codes	Cardiac Catheterization Procedures
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
with RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
with RHC and bypass grafts	
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
with LHC	
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with LHC and bypass grafts	
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
with RHC and LHC	

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Codes	Cardiac Catheterization Procedures
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**
CPT® 93593 to 93597 are appropriate for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

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Imaging and Surveillance per Congenital Lesion (PEDCD-2.4)

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- Echocardiography is often repeated frequently throughout a pediatric individual's life and are generally considered medically necessary regardless of symptoms based on the lesion and age of the individual.
  - Modifiers following guidelines
    - Some congenital conditions may require more frequent testing, especially with more complex heart disease, congestive heart failure, obstructive heart lesions, ductal dependent lesions, changes in clinical status, repeat interventions, and/or in neonates.
    - Any individual being treated for heart failure, with consideration for changing medical regimen can have an echocardiogram.
- Echocardiography is performed during the physician office visit, and these studies should not be denied because of lack of recent contact.

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Atrial Defects: Secundum ASD, PFO, and Partial Anomalous Pulmonary Venous Return (PAPVR), Sinus Venosus Defect (PEDCD-2.4.1)

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Criteria

For imaging in AVSD, see **AVSD (Atrioventricular canal, endocardial cushion defect) (PEDCD-2.4.3)**.

PFO (Patent Foramen Ovale)

- Routine surveillance in an asymptomatic individual with PFO is considered not medically necessary.
  - PFO is a normal variant.
  - In infants, a PFO that is difficult to distinguish from an ASD can be imaged with the same guidelines as used in a small unrepaired ASD (with congenital echo).
- Follow-up imaging with an echocardiogram is considered medically necessary when there is documentation of the following:
  - New cardiac symptoms
  - A concern that the last echocardiogram was equivocal for other cardiac issues
  - Question of a clot/embolism that has gone across the PFO
  - Prior echocardiogram did not differentiate the PFO from a secundum ASD.
- TTE (CPT® 93306- non congenital echocardiogram) is considered medically necessary when an individual with a prior history of PFO requires an echocardiogram for any new reason.
- Preoperative for PFO closure
  - TTE or TEE
    - Closure is rare in children, TTE or TEE is considered medically necessary in individuals with transient ischemic attacks or strokes with suspected atrial level shunt.
    - CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest if unclear findings from echocardiogram
- Post-procedure PFO closure
  - Post-surgical imaging as follows (PFO generally requires less frequent monitoring post device than ASDs):

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        - TTE one time within 30 days of closure
        - TTE one time within 6 months of PFO closure
    - TTE or TEE is considered medically necessary at any time post-procedure when there is concern for **any** of the following:
        - Infection
        - Malposition
        - Embolization
        - Persistent shunt
            - For persistent shunt, TTE is considered medically necessary every 3 months until the finding is stable or there is a need for intervention.

Secundum ASD, Sinus Venosus ASD, Asymptomatic Isolated (ASD) and Unobstructed (PAPVR)

- Any surgical status
    - TTE is considered medically necessary for any of the following:
        - Initial evaluation of a change in clinical status and/or new concerning signs or symptoms
        - Prior to planned cardiac intervention
        - Repeat any time prior to next allowed study if concern for elevated pulmonary vascular resistance/Pulmonary hypertension
    - CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
        - If anomalous vein or SV defect cannot be assessed on echo
        - To assess shunt or RV for considering of surgery, or if echocardiogram equivocal
    - Diagnostic heart catheterization is considered medically necessary when there is concern for pulmonary vascular disease.
- Unrepaired
    - Newborn with isolated ASD can have one repeat TTE within 2 months.
    - Small asymptomatic isolated ASD with no pulmonary hypertension can have TTE as follows:
        - Infant <6 months: every three months
        - Infant ≥6 months: repeat at one year
        - Child: Every 3 years
    - Routine surveillance for moderate ASD or PAPVR >1 vein
        - Infant: every 3 months
        - Echocardiogram (TTE) every 1 year
- Prior to planned repair of ASD
    - TTE and/or TEE
    - MRI if any residual issues unanswered by echo
- Prior to planned SV defect or PAPVR

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- TTE and/or TEE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

- Post- ASD closure with device
  - TTE post device closure
    - 1 week
    - 1 month
    - Every 3 months
    - 1 year
    - Every 2 years
  - May repeat TTE every 3 months until the finding is stable or there is a need for intervention if there is significant residual shunt, valvular or ventricular dysfunction, arrhythmias, and/or pulmonary hypertension
- Post-surgical closure of ASD
  - TTE
    - Within the first month after surgery
    - Within the 1st year
    - Every 2 years if no residual shunt
    - Every year if there is residual shunt and no right ventricular dilation
    - Every 3 months if there is residual shunt with right ventricular dilation until the finding is stable or there is a need for intervention

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Ventricular Septal Defect (VSD) (PEDCD-2.4.2)

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Criteria

All

TTE is considered medically necessary for any of the following:

- Change in clinical status and/or new concerning signs or symptoms
- Prior to planned cardiac intervention

Unrepaired

TTE

- Small muscular VSD, No Symptoms, No pulmonary hypertension
  - Newborn: 1 repeat within 2 months
  - Infant: every 6 months
  - Child: every 3 years
- Small VSD in location other than muscular
  - Newborn: 1 repeat TTE within 2 months
  - Infant: TTE every 6 months
  - Child: TTE every year
- Moderate or large VSD on medical management
  - Newborn: TTE every 2 weeks
  - Infant: every 1-month
  - Child <2 years old: TTE every 3 months
  - Child >2 years old: TTE every year

Diagnostic heart catheterization is considered medically necessary after 2 months of age when there is a right-to -left shunt to evaluate for pulmonary vascular disease.

Post Repair VSD

TTE is considered medically necessary after surgical repair as follows:

- one study within one month after surgery
- one year after surgery
- then every 2 years

TTE is considered medically necessary after transcatheter repair as follows:

- 1 month post-procedure

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- 6 months post-procedure
- 12 months post-procedure
- then every 2 years

TTE is considered medically necessary following surgical or device closure with significant residual shunt, valvular or ventricular dysfunction, arrhythmias, and/or pulmonary hypertension every 3 months.

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AVSD (Atrioventricular Canal, Endocardial Cushion Defect) (PEDCD-2.4.3)

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Criteria

Any surgical status

TTE is considered medically necessary for any of the following:
- Change in clinical status and/or new concerning signs or symptoms
- Prior to planned cardiac intervention

MRI cardiac is considered medically necessary if TTE is suboptimal regarding RV size or pulmonary and systemic blood flow.

Cardiac catheterization is considered medically necessary if there is concern for pulmonary vascular disease.

Unrepaired
- Partial/transitional atrioventricular canal (AVC)
  - TTE is considered medically necessary as follows:
    - Newborn: repeat once within the next 2 months
    - Infant: every 3 months
    - Child <1 years: every 2 months
    - Child ≥1 years: every 3 months
- Complete AVC
  - TTE
    - <3 months: TTE every 2 weeks
    - ≥3 months: TTE monthly

Repaired (TTE)
- Within one month of surgery
- Within 1 year
- Then annually

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TTE is considered medically necessary every 3 months until the finding is stable or there is a need for intervention when there is residual shunt, valvular LV dysfunction, LVOT obstruction, arrhythmia, arrhythmia or PHT, or symptoms of heart failure.

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PDA (Patent Ductus Arteriosus) (PEDCD-2.4.4)

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Criteria

Any surgical status

TTE is considered medically necessary for any of the following:
- Initial evaluation of a change in clinical status or new concerning signs or symptoms
- Prior to planned cardiac intervention

Cardiac catheterization is considered medically necessary when there is concern for pulmonary vascular disease.

Unrepaired
- Newborn: one repeat TTE in newborn period
  - None, if spontaneously closed
- >1-year-old
  - No Routine surveillance in an asymptomatic individual with a trivial, silent PDA
- Infant
  - Small PDA: TTE every 3 months
  - ≥ Moderate PDA: TTE every month
- Pre-adolescent Child
  - Small PDA: every 1 year
  - Moderate PDA: every 6 months
- Adolescent: every 3 years

Post PDA device
- Post procedure surveillance (TTE)
  - One echo in first 30 days
  - Annually for first 2 years
  - Every 5 years after first 2 years
- Post procedure LPA stenosis or aortic obstruction
  - Pre-adolescent Child
    - TTE annually

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- MRA/CTA Chest, or (lung perfusion for LPA stenosis) if questions remain unanswered after TTE

◦ Adolescents

- Every two years TTE and
- MRA/CTA Chest, or (lung perfusion for LPA stenosis) if questions remain unanswered after TTE

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TAPVR Total Anomalous Pulmonary Venous Return (PEDCD-2.4.5)

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Criteria

Any surgical status

- TTE, TEE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest, Lung perfusion scan are considered medically necessary for any of the following:
  - Change in clinical status and/or new concerning signs or symptoms
  - Prior to planned cardiac intervention

Unrepaired

- No restrictions

Repaired

- TTE one post procedure evaluation first 30 days
- TTE every 3 months in infancy
- Pre-adolescent Child: every 1 year
- Adolescence: TTE every 2 years

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Ebstein Anomaly and TV Dysplasia (PEDCD-2.4.6)

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Criteria

Any surgical status

- TTE, TEE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest are considered medically necessary for any of the following:
  - Change in clinical status and/or new concerning signs or symptoms
  - Prior to planned repair or intervention

Unrepaired

- Newborn: repeat study within 30 days
- Infant
  - Trivial TR is a normal finding.
  - Mild TR- TTE: every year
  - ≥ Moderate TR- TTE: every 3 months
- Child
  - Mild TR: every year TTE
  - ≥ Moderate: every 6 months

Repaired (TTE)

- Post-op within 30 days
- TTE once a year
- TTE every 6 months if valvular or ventricular dysfunction, or arrhythmias
- Pre-adolescent Child: every year
- Adolescent: every 2 years
- Every 3 months if CHF or atrial arrhythmias

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Pulmonary Stenosis (PS) (PEDCD-2.4.7)

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Criteria

Any surgical status
- TTE is considered medically necessary for any of the following:
  - Change in clinical status and/or new concerning signs or symptoms
  - Prior to planned cardiac procedure
  - If increasing gradient, 1 additional study prior to next allowed study
  - PS in Williams syndrome (see **LVOT Lesions (PEDCD-2.4.10)**)

Unrepaired
- Neonate
  - TTE repeat study within 30 days
- Infant PS asymptotic (any severity)
  - TTE every 3 months
- Pre-adolescent Child
  - TTE every 1 year
- Adolescent
  - TTE every 2 years
  - MRA/CTA Chest if pulmonary artery dilation every 3 years

Post procedure (TTE)
- Within 30 days
- Infant
  - TTE every 3 months
- Pre-adolescent Child
  - TTE 1 year
  - Moderate or severe sequelae TTE every 6 months
- Adolescent
  - TTE every 2 years
- Any individual with heart failure: TTE every 3 months

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Pulmonary Atresia with Intact Septum (PAIVS) (PEDCD-2.4.8)

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Criteria

Any surgical status

TTE is considered medically necessary for any of the following:

- Prior to planed repair
- Change in clinical status and/or new concerning signs or symptoms

Post procedural: Palliation

- TTE
  - 1 within 30 days
  - Every 1 month until repaired

Post procedural: Complete Repair

- TTE within 30 days post-op
- Any age
  - TTE every three months for CHF
- Infant
  - TTE at 3 months in asymptomatic infant
- Child (all ages)
  - TTE annually
  - Every 6 months if moderate sequelae
- Adolescent (in addition to TTE)
  - CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest every 3 years

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Mitral Valve Disease (PEDCD-2.4.9)

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Criteria

Any surgical status

- TTE is considered medically necessary for any of the following:
  - Prior to planned surgery
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms

Unrepaired congenital mitral valve stenosis

- Infant in first three months of life
  - Weekly TTE
- After 3 months (TTE)
  - Every 3 months if mild MS
  - Every month if ≥ moderate MS
- Child (TTE)
  - With moderate MS: every 3 months until a decision is made to intervene
  - Child with mild symptoms: annually

Unrepaired: Congenital Mitral Regurgitation (MR) including Mitral Valve Prolapse

- Infant
  - TTE every 6 months an asymptomatic infant with mild MR
  - TTE every month in asymptomatic infant with ≥ moderate MR
- Child
  - TTE every 2 years with mild MR, normal LV size and systolic function
  - TTE every 6 months with ≥ moderate MR
  - TTE every 3 years in an asymptomatic with MVP and mild MR

Post procedure, surgical or catheter based

- TTE within 30 days
- Infant
  - TTE every 3 months, mild MS or MR, and no LV dysfunction
  - TTE every month in ≥ moderate MS or MR, dilated LV, and no LV dysfunction
- Child
  - TTE annually

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- In a child with normal prosthetic mitral valve function and no LV dysfunction
- In a child with mild MS or MR, and no LV dysfunction

◦ TTE every 3 months

- In a child with ≥ moderate MS or MR, dilated LV, and no LV dysfunction
- In a child with prosthetic mitral valve or ventricular dysfunction, and/or arrhythmias

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LVOT Lesions (PEDCD-2.4.10)

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Criteria

Subvalvular Aortic stenosis

Any surgical status

- TTE, TEE, Cardiac MR/CT are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Preoperative
- If aortic dimension z-score >2
  - TTE or Chest CTA/MRA every 2 years if stable z-score
  - TTE or Chest CTA/MRA every 6 months if increasing z-score

Unrepaired

- Newborn: No restrictions
- Infant TTE
  - 1 monthly for any subvalvular AS, but ≤ mild AR
- Child
  - TTE one per year if mild AS and no AR
  - TTE every 6 months ≥ moderate subvalvular AS and/or mild AR
  - Routine surveillance (6–12 months) in an asymptomatic child with ≥ moderate AS and/or ≥ moderate AR

Repaired

- Infant
  - TTE within 30 days
  - TTE every 3 months ≤ mild MS and or AR
  - TTE every 1 month ≥ moderate AS or AR
- Child
  - TTE every 1 year ≤ Mild AS or AR
  - TTE every 6 months ≥ moderate AS or AR
  - TTE every 3 months if heart failure

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Aortic Valve Stenosis and/or regurgitation/ BAV (Bicuspid Aortic Valve)

Any surgical status

- TTE, TEE, Cardiac MR/CT are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Preoperative

Unrepaired

- Infant <3 months
  - TTE 1 per week
- Infant >3 months
  - TTE every 3 months
  - TTE every 1 month, if ≥ moderate AS or AR
- Child
  - TTE every 1 year with mild AS/AR and no aortic dilation
  - TTE every 6 months with moderate AS/AR, or aortic dilation.
  - TTE every 3 years if BAV with trivial or mild valvular dysfunction and no aortic root dilation
  - Every 6 months in any as with increasing z-score aortic root ascending aorta

Post procedural

- Within 30 days TTE
- Infant
  - Every 1 month following neonatal intervention with ≥ moderate AS or AR or LV dysfunction
  - Every 3 months ≤mild AS/AR and no LV dysfunction
- Child (TTE)
  - 6 months echocardiogram if ≥moderate AS or AR
  - 1-year echocardiogram if ≤mild AS or AR, and/or normal prosthetic valve
  - Every 3 months if CHF or Ventricular dysfunction

Supravalvular AS

Any surgical status

- TTE, TEE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Preoperative
  - Williams syndrome

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        - Individuals with Williams syndrome can be screened/evaluated for arch abnormalities and pulmonary artery abnormalities and coronary artery abnormalities with the same intervals as TTE referenced below.
    - Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) is considered medically necessary at initial evaluation and for cardiac symptoms, change in clinical status, and/or new concerning signs or symptoms

Unrepaired

- Infant
    - TTE every 3 months
- Child
    - TTE every 1 year
    - TTE every 6 months if moderate AS

Post-operative (TTE)

- Within 30 days
- Every 2 years in mild to moderate AS
- Every 6 months if ≥ moderate AS

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Aortic Coarctation and IAA (Interrupted Aortic Arch) (PEDCD-2.4.11)

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Criteria

All individuals

- TTE, MRA/CTA Chest are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Prior to planned surgery/intervention
- Cardiac MR/CT is considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Prior to planned surgery/intervention if any issues remain not answered on echo

For screening for related intracranial aneurysms, see **Cerebral Intracranial Aneurysms (HD-12.1)**.

Unrepaired Aortic Coarctation

- Newborn, TTE weekly if assessing for ductal closure
- Infant with mild coarctation in absence of PDA
  - Echocardiogram every 3 months
- Child with mild coarctation
  - Echocardiogram every 1 year
  - MRA Chest, CTA Chest every 3 years

Post procedure: surgical or catheter based

- TTE
  - Within 30 days of procedure
  - Every 3 months if mild or no sequelae in first year
  - Every 6 months if mild or no sequelae in the second year
  - Every 1 year after the second year
  - Every 3 months at any time if CHF symptoms or ≥ moderate sequelae
- MRA/CTA Chest every 3 years (include Cardiac MR/CT if issues not clarified on echo)

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- For screening for intracranial aneurysms, see **Cerebral Intracranial Aneurysms (HD-12.1)**.

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Coronary Anomalies (PEDCD-2.4.12)

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Criteria

Suspected Anomalous Coronary Artery

CCTA to rule out anomalous coronary artery is considered medically necessary for the following:

- to map an anomalous coronary artery prior to an invasive procedure
- previous imaging study did not clearly demonstrate an anomalous coronary artery

Baseline Imaging

For baseline imaging in an individual with anomalous coronary artery, the following imaging/procedures are considered medically necessary:

- TTE
- CCTA or CMR
- Stress imaging
- Cardiac PET when TTE, CCT/CCTA, and CMR are inconclusive or suboptimal
- Diagnostic heart catheterization when other imaging is inconclusive, suboptimal, or fails to provide information essential to treatment planning

New or Worsening Symptoms/Change in Clinical Status

For new or worsening symptoms or change in clinical status in an individual with anomalous coronary artery, the following imaging/procedures are considered medically necessary:

- TTE
- CCT **or** CMR
- MRA Chest or CTA Chest when not previously performed **or** the origin of the coronaries arteries is not at the level of the Sinus of Valsalva
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)- to assess the need for surgery

Pre-intervention Planning

Prior to surgery for anomalous coronary artery, the following imaging/procedures are considered medically necessary:

- TTE

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- CCT **or** CMR
- MRA Chest or CTA Chest when not previously performed **or** the origin of the coronaries arteries is not at the level of the Sinus of Valsalva
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)- to assess the need for surgery

Post-procedure Imaging

Post-procedure for anomalous coronary artery, the following imaging/procedures are considered medically necessary:

- TTE
  - Within 30 days of procedure
  - Monthly the first year following repair
  - Every 3 months after first year of surgery
  - Annually after the second year of surgery
  - Every 3 months if ventricular dysfunction
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)
  - First postoperative year
  - If EKG stress test positive of equivocal

Surveillance Imaging

For surveillance of anomalous coronary artery, the following imaging/procedures are considered medically necessary:

- TTE and Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) every 2 years for anomalous right coronary artery from the left aortic sinus
- TTE and Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) annually for unrepaired or incompletely repaired, anomalous left coronary artery from the right coronary sinus
- TTE every 2 years for a small coronary fistula
- TTE annually for a moderate or large coronary fistula

Background and Supporting Information

CPT® 75574 for evaluating coronary artery anomalies

CPT® 75573 for congenital heart disease

CTA Chest CPT® 71275 can be added to evaluate great vessels.

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Tetralogy of Fallot (TOF) (PEDCD-2.4.13)

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Criteria

Any surgical status

- TTE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Evaluation prior to planed pulmonary valve replacement, cardiac intervention, or surgery

Unrepaired

- Newborn: TTE no limits
- Infant: every 1-month

Post procedure palliation

- TTE every one-month following palliative procedure prior to complete repair, valvuloplasty, PDA and/or RVOT stenting, or shunt placement before complete repair

Post-operative TOF (initial repair)

- TTE
  - Within 30 days of repair
  - Pre-adolescent Child: every 12 months
  - Adolescent: every 24 months
  - Every 6 months in an individual with valvular dysfunction other than pulmonary valve, RVOT obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of an RV-to-PA conduit
  - TTE every 3 months if CHF
- Cardiac MR/CT, MRA/CTA Chest
  - Routine surveillance (36 months) in an individual with pulmonary regurgitation and preserved ventricular function
  - 12 months if moderate (≥150 mL/m^2) or progressive (increase of >25 mL/m^2) RV dilatation or dysfunction (RVEF ≤48% or ≥6% decrease in EF) or nearing imaging criteria for PVR

Post-surgical or catheter based pulmonary valve replacement

- TTE

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  - Within 30 days follow-up
  - 1 and 6 months after replacement
  - One year post procedure
  - Annually after replacement
  - Every 6 months if RV-to-PA conduit dysfunction, valvular or ventricular dysfunction, branch pulmonary artery stenosis or arrhythmias
  - Every 3 months if CHF symptoms
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest every 2 years

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Double Outlet Right Ventricle (DORV) (PEDCD-2.4.14)

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Criteria

Any surgical status

- TTE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Evaluation prior to repair

Unrepaired

- TTE
  - Newborn: no limit
  - Monthly infant with balanced systemic and pulmonary circulation
  - Every 3 months child with balanced circulation

Postoperative

- TTE
  - Within 30 days
  - First year post-op every 6 months
  - After one year, TTE every 1 year
  - TTE 3 months in an individual with valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of an RV-to-PA conduit, heart failure
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
  - 3 years for asymptomatic individual

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D-Loop Transposition of the Great Arteries (D-Loop TGA) (PEDCD-2.4.15)

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Criteria

Any surgical status

- **TTE, CMR and/or MRA Chest or CCT/CCTA and/or CTA Chest**, **Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)** are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Any time after procedure involving coronary arteries
- **CMR and/or MRA Chest or CCT/CCTA and/or CTA Chest** every 5 years.

Unrepaired (TTE)

- No Limits

Post arterial switch

- TTE
  - Within 30 days of repair
  - Infant: every one month
  - Child: every 3 months
  - Child with ≥ moderate sequelae: TTE every three 3 months (moderate valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, branch pulmonary artery stenosis, or arrhythmias
- Routine CMR/CT
  - Every 3 years
  - Every year if neo-aortic insufficiency
- MRA/CTA Chest
  - Every 3 years
  - Every year if neo-aortic insufficiency or aortic dilation
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)
  - 1 routine test after arterial switch at any time

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Post Rastelli

- TTE
  - Within 30 days
  - Every three months following procedure for one year
  - Pre-adolescent Child: Every 6 months following the first year after repair if no or mild sequelae
  - Adolescent: annually
  - Every three months if moderate valvular dysfunction, LVOT obstruction, presence of an RV-to-PA conduit, branch, pulmonary artery stenosis, or arrhythmias, or heart failure
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest every 3 years

Post atrial switch

- TTE Every 1 year if mild to no symptoms
  - Every 3 months TTE, and CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest if ≥moderate systemic AV, valve regurgitation, systemic RV dysfunction, LVOT obstruction, or arrhythmias, or CHF
  - Routine **CMR and/or MRA Chest or CCT/CCTA and/or CTA Chest** every 3 years

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Congenitally Corrected Transposition of the Great Arteries (ccTGA, LTGA) (PEDCD-2.4.16)

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Criteria

Any surgical status

- TTE, TEE, **CMR and/or MRA Chest or CCT/CCTA and/or CTA Chest** are considered medically necessary for any of the following:
  - Change clinical status and/or new concerning signs or symptoms
  - Preoperative evaluation (typically within one month)
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest every 3 years

Unrepaired

- TTE
  - Newborn: weekly
  - Infant
    - Every 3 months if no cardiac symptoms and only mild findings
    - Every 1 month is cardiac symptoms and moderate findings
  - Child
    - <2 years: every 3 months
    - >2 years: every 1 year
    - Every 6 months if ≥moderate AV regurgitation
    - Every 3 months if CHF symptoms
  - CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
    - Every 3 years

Postoperative: Anatomic Repair

- TTE
  - Post–operative evaluation (within 30 days)
  - Every 3 months within a year following repair in an asymptomatic individual with no or mild sequelae
  - Every 1 year after the first year following repair in an asymptomatic individual with no or mild sequelae

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  - Every 6 months if valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, or presence of a RV-to-PA conduit
  - Every 3 months if CHF symptoms
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
  - Every 3 years

Postoperative: Physiological Repair with VSD Closure and/or Left Ventricle-to-Pulmonary Artery (LV-to-PA) Conduit

- TTE
  - Postoperative evaluation (within 30 days)
  - Every 3 months within a year following repair in an asymptomatic individual with no or mild sequelae
  - Annually in an asymptomatic individual with no or mild sequelae
  - Every 3 months if in an individual with ≥ moderate systemic AV valve regurgitation, systemic RV dysfunction, and/or LV-to-PA conduit dysfunction, or with CHF symptoms
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest every 3 months in an individual with ≥ moderate systemic AV valve regurgitation, systemic RV dysfunction, and/or LV-to-PA conduit dysfunction, or with CHF symptoms

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Truncus Arteriosus (PEDCD-2.4.17)

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Criteria

Any surgical status

- TTE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest are considered medically necessary for any of the following:
  - Initial evaluation of change in clinical status and/or new concerning signs or symptoms
  - Prior to planned intervention or surgery

Postoperative

- TTE
  - Within 30 days
  - Monthly in first year after surgery
  - After first year every 6 months
  - Every 3 months if
    - ≥ moderate truncal stenosis or regurgitation
    - Residual VSD or RV to PA conduit or Branch PA obstruction
    - Symptoms of CHF
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
  - Annually if ≥ moderate Truncal stenosis or regurgitation

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Single Ventricle (SV) (PEDCD-2.4.18)

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Criteria

SV references individuals not amenable to biventricular repair, including but not limited to hypoplastic left heart syndrome, tricuspid atresia, double inlet left ventricle, mitral atresia, unbalanced AVSD, and forms of PA/IVS.

Any surgical status

- Any/All: **TTE, TEE, CMR and/or MRA Chest or CCT/CCTA and/or CTA Chest, and Diagnostic heart catheterization** (CPT® 93593, 93594, 93595, or 93597) are considered medically necessary for any of the following:
  - Change clinical status and/or new concerning signs or symptoms
  - Preoperative evaluation (typically within one month)

Unrepaired SV

- TTE allowed one study per week

Stage I palliation (includes Norwood Procedure, PA Banding, and Hybrid Procedures)

- Routine weekly TTE is considered medically necessary.

Stage II palliation (includes Glenn anastomosis procedure and hemi Fontan)

- Within 30 days after surgical or catheterization intervention
- One TTE per month is considered medically necessary.

Stage III also called Fontan

- TTE within 30 days
- TTE every three months within first post-op year
- Every 6 months after first year
- Every 3 years allow **CMR and/or MRA Chest or CCT/CCTA and/or CTA Chest**
- TTE every 3 months until the finding is stable or there is a need for intervention if there is valvular dysfunction, arrhythmias, heart failure

Surveillance

Diagnostic heart catheterization is considered medically necessary for all Single Ventricles once every 10 years.

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Eisenmenger and PHT (with CHD)-(PEDCD-2.4.19)

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Criteria

Any surgical status

- TTE, CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest are considered medically necessary for any of the following:
  - Change clinical status and/or new concerning signs or symptoms
  - Preoperative evaluation (typically within one month)

Initial evaluation (TTE)

- Change in clinical status and/or new concerning signs or symptoms
- Before and after PHT therapy

Eisenmenger Syndrome (ES) individual

- TTE every 6 months

PHT associate with CHD

- TTE is medically necessary at the frequency requested by the provider for individuals with unrepaired disease and evidence of elevated pulmonary vascular resistance.
- TTE and CCT **or** CMR for changes in change in pulmonary arterial hypertension-targeted therapy in an individual with postoperative PH
- TTE every 3 months in postoperative stable child with PHT

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Evidence Discussion

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Congenital Heart Disease

Tetralogy of Fallot (TOF)

Tetralogy of Fallot is one of the most extensively studied forms of repaired congenital heart disease. Although surgical survival is excellent, long-term follow-up studies have demonstrated ongoing risk for pulmonary regurgitation, right ventricular (RV) dilation, ventricular dysfunction, arrhythmias, branch pulmonary artery stenosis, and sudden cardiac death (Valente et al., 2014). Because progressive RV enlargement may occur years before symptoms develop, routine surveillance is considered essential to identify individuals who may benefit from pulmonary valve replacement before irreversible ventricular dysfunction occurs. The American Society of Echocardiography multimodality imaging guidelines emphasize the complementary roles of transthoracic echocardiography (TTE) and cardiovascular magnetic resonance imaging (CMR), with CMR considered the reference standard for quantification of RV volumes and pulmonary regurgitation severity (Valente et al., 2014; Sachdeva et al., 2020).

Current evidence supports periodic echocardiographic surveillance following repair, with advanced imaging used to evaluate progressive RV dilation, ventricular dysfunction, conduit failure, branch pulmonary artery stenosis, and pulmonary valve dysfunction. More frequent surveillance is warranted when there is evidence of ventricular dysfunction, significant pulmonary regurgitation, arrhythmias, or suspected need for reintervention (Sachdeva et al., 2020).

D-Loop Transposition of the Great Arteries (D-TGA)

Long-term outcomes after repair of D-transposition of the great arteries have improved substantially, but residual cardiovascular morbidity remains common. Individuals who undergo arterial switch operations may develop neoaortic root enlargement, neoaortic insufficiency, coronary artery abnormalities, pulmonary artery stenosis, ventricular dysfunction, and arrhythmias later in life (Cohen et al., 2016). Because coronary artery manipulation is intrinsic to the arterial switch procedure, continued monitoring of coronary anatomy and ventricular performance remains important even in asymptomatic individuals.

Professional society imaging guidelines recommend serial echocardiography with periodic CMR or cardiac CT to evaluate ventricular function, neoaortic dimensions, and coronary anatomy when echocardiographic assessment is incomplete (Cohen et al., 2016; Sachdeva et al., 2020). Individuals undergoing atrial switch or Rastelli

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procedures have additional risks including systemic right ventricular dysfunction, conduit degeneration, atrioventricular valve regurgitation, and arrhythmias, often requiring more intensive surveillance than arterial switch recipients.

Single Ventricle Physiology and Fontan Circulation

Individuals with single ventricle physiology and Fontan circulation represent one of the highest-risk populations within congenital heart disease. The American Heart Association scientific statement on Fontan circulation identified substantial long-term risks including ventricular dysfunction, atrioventricular valve regurgitation, arrhythmias, thromboembolism, protein-losing enteropathy, lymphatic dysfunction, hepatic disease, and heart failure (Rychik et al., 2019). These complications may develop despite stable clinical status, supporting the need for continued surveillance throughout childhood and adulthood.

Comparative studies have demonstrated important limitations of echocardiography for assessment of ventricular volumes and function in Fontan patients, with CMR providing superior quantitative evaluation of ventricular performance and anatomy (Margossian et al., 2009). The AHA scientific statement recommends periodic advanced imaging and selective cardiac catheterization because hemodynamic abnormalities may not be fully appreciated by noninvasive testing alone (Rychik et al., 2019).

Double Outlet Right Ventricle (DORV)

Published evidence regarding postoperative surveillance in DORV consists primarily of observational studies, surgical outcome series, and congenital heart disease imaging guidelines. Long-term complications following repair include ventricular dysfunction, residual ventricular outflow tract obstruction, conduit degeneration, branch pulmonary artery stenosis, arrhythmias, and residual shunting (Sachdeva et al., 2020).

Because anatomic variability is substantial, professional society recommendations emphasize individualized follow-up using serial echocardiography and advanced imaging when ventricular function, conduit anatomy, or pulmonary artery anatomy cannot be adequately assessed with echocardiography alone (Prakash et al., 2010; Sachdeva et al., 2020). Although precise surveillance intervals are largely consensus-based, ongoing monitoring is supported by the recognized risk of reintervention and progressive postoperative complications.

Congenitally Corrected Transposition of the Great Arteries (ccTGA)

Individuals with congenitally corrected transposition of the great arteries remain at lifelong risk for systemic right ventricular dysfunction, systemic atrioventricular valve regurgitation, conduction abnormalities, arrhythmias, and progressive heart failure. These complications develop gradually and may be clinically silent during

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early stages, making serial imaging essential for timely identification of disease progression (Sachdeva et al., 2020).

CMR has become increasingly important because assessment of systemic right ventricular size and function can be challenging using echocardiography alone. Contemporary congenital heart disease imaging guidelines support periodic advanced imaging in addition to echocardiography to monitor ventricular performance and valvular disease (Sachdeva et al., 2020; Hundley et al., 2010).

Truncus Arteriosus

Contemporary surgical outcomes for truncus arteriosus have improved significantly; however, long-term morbidity remains substantial because of conduit degeneration, truncal valve dysfunction, branch pulmonary artery stenosis, ventricular dysfunction, and the need for repeat intervention. Serial imaging is important because conduit and truncal valve deterioration may progress before significant clinical symptoms develop (Sachdeva et al., 2020).

Echocardiography remains the primary surveillance modality, while CMR and CT may provide additional evaluation of conduit anatomy, ventricular function, and branch pulmonary arteries when echocardiographic assessment is limited (Prakash et al., 2010; Sachdeva et al., 2020).

Coronary Artery Anomalies

Congenital coronary artery anomalies are recognized causes of myocardial ischemia, exercise-related symptoms, and sudden cardiac death in children and young adults. Echocardiography serves as the initial diagnostic test; however, cross-sectional imaging frequently provides superior visualization of coronary origin and course. Current multimodality imaging recommendations support the use of coronary CTA and CMR when coronary anatomy cannot be adequately defined by echocardiography or when procedural planning is required (Truong et al., 2012; Sachdeva et al., 2020).

Functional testing with stress imaging may provide additional information regarding ischemic burden and aid decisions regarding intervention. Individuals who undergo repair require ongoing surveillance to assess ventricular function, coronary patency, and exercise-related ischemia (Sachdeva et al., 2020).

Kawasaki Disease-Associated Coronary Artery Disease

The 2024 American Heart Association Scientific Statement on Kawasaki disease reinforced the importance of risk-stratified cardiovascular surveillance based on coronary artery involvement. Echocardiography remains the primary imaging modality for diagnosis and follow-up, while coronary CTA, CMR, and invasive angiography play increasingly important roles for individuals with medium, large, or giant coronary aneurysms (Jone et al., 2024).

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Recent registry studies demonstrate that small aneurysms frequently regress and are associated with very low long-term event rates, whereas large and giant aneurysms are associated with persistent risk of thrombosis, stenosis, myocardial infarction, and need for coronary intervention (Jone et al., 2024). Current AHA recommendations support increasingly intensive surveillance, including stress imaging and advanced coronary imaging, as aneurysm size increases.

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Heart Murmur

Guideline

Heart Murmur (PEDCD-3.1)
References (PEDCD-3)

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Heart Murmur (PEDCD-3.1)

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Criteria

When evaluating an individual with a murmur for the first time, it will not be known whether the individual has congenital heart disease or not.

- Any one of the TTE code combinations is considered medically necessary for evaluation of either:
  - Documentation of any pathologic murmur
  - Any murmur with associated cardiac signs or symptoms
- Repeat echocardiography is considered not medically necessary if the initial echocardiogram was normal and the murmur has not changed in quality.

Initial pediatric TTE combinations

CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
CPT® 93303, CPT® 93320, and CPT® 93325
CPT® 93303, CPT® 93306
CPT® 93306 (CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately)

Evidence Discussion

A 2022 review used evidence from diagnostic studies, systematic review data, cost analyses, and appropriate use criteria to evaluate murmur assessment, referral, and echocardiography. Outcome data included diagnostic classification of innocent versus pathologic murmurs, congenital heart disease detection, test accuracy, cost-effectiveness, and referral appropriateness. Reported diagnostic performance included physician examination sensitivity of 79.7% and specificity of 88.5% for distinguishing pathologic from innocent murmurs. The review noted that echocardiography is appropriate for pathologic-sounding murmurs or murmurs associated with cardiovascular signs or symptoms, while echocardiography is rarely appropriate for innocent-sounding murmurs without symptoms, concerning examination findings, or family history. In newborns and infants with concerning murmurs, pediatric cardiology referral is preferred before reflex echocardiography, and routine ECG or chest radiography is not supported because these tests may misclassify murmurs (Ford et al., 2022).

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Chest Pain

Guideline

Suspected Cardiac Chest Pain (PEDCD-4.1)
References (PEDCD-4)

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Suspected Cardiac Chest Pain (PEDCD-4.1)

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Criteria

- Any one of the TTE combinations below is considered medically necessary to evaluate chest pain when **one** or more of the following applies:
  - Exertional chest pain
  - Non-exertional chest pain with abnormal EKG
  - Chest pain with signs or symptoms of pericarditis
  - First-degree relative with sudden unexplained death or cardiomyopathy
  - Recent onset of fever
  - Recent illicit drug use
  - Other signs or symptoms of cardiovascular disease
- Repeat TTE is considered medically necessary after a normal initial TTE when **any** of the following conditions is present:
  - Increased severity or change in quality of the chest pain
  - New signs or symptoms of cardiovascular disease other than pain
  - New abnormality on EKG
- CMR or CCT if prior evaluation suggests cardiomyopathy, myocarditis, or coronary artery abnormality
- CTA Chest **or** MRA Chest if pulmonary embolism or aortic dissection is suspected
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) is considered medically necessary to evaluate chest pain in the setting of **any** of the following:
  - Other imaging suggests coronary artery abnormality.
  - ETT suggests ischemia.
  - EKG is uninterpretable.
  - Any indication in section **Stress Testing with Imaging (CD-1.4)** in the Cardiac Imaging Guidelines.

Coding

Initial pediatric TTE combinations

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CPT® 93303, CPT® 93320, and CPT® 93325
CPT® 93303, CPT® 93306
CPT® 93306 (CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately)

Codes	Description
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging

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Codes	Description
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection

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Evidence Discussion

Pediatric chest pain is uncommon from a cardiac source with concerning etiologies including hypertrophic obstructive cardiomyopathy or other left ventricular outflow obstruction when chest pain occurs with abnormal history or examination findings. (Campbell et al., 2014). Cardiovascular magnetic resonance is supported as a selected diagnostic test when pediatric chest pain is associated with suspected myocarditis, elevated troponin, pericardial disease, cardiomyopathy, coronary anomalies, or other abnormal cardiac testing, but not as routine screening in otherwise low-risk patients (Dorfman et al., 2022).

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Syncope

Guideline

Syncope (PEDCD-5.1)
References (PEDCD-5)

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Syncope (PEDCD-5.1)

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Criteria

- TTE is considered medically necessary for pediatric individuals with syncope and one or more of the following:
  - Exertional syncope
  - Unexplained post-exertional syncope
  - Abnormal EKG
  - Absence of prodromal symptoms
  - Presence of preceding palpitations within seconds of loss of consciousness
  - Lack of a prolonged upright posture
  - Syncope in response to auditory or emotional
  - First-degree relative with either of the following before age 50:
    - Sudden cardiac arrest or death
    - Pacemaker or implantable defibrillator placement
  - First-degree relative with cardiomyopathy
  - Known congenital heart disease
  - History of Kawasaki disease, or other coronary pathology
  - Pathologic murmur, irregular rhythm, gallop, or click on physical examination
- Repeat TTE is considered medically necessary after a previously normal TTE when **one** of the following conditions is present:
  - Increased severity or change in characteristics of the syncope
  - New signs or symptoms of cardiovascular disease other than syncope
  - Family of history of sudden death, cardiomyopathy
  - New abnormality on EKG
- CCT **or** CMR is considered medically necessary when TTE suggests coronary artery abnormalities, cardiomyopathy, or myocarditis.
- MRA or CTA Chest if pulmonary embolism or aortic dissection is suspected
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) is considered medically necessary (any):
  - If other imaging suggests coronary artery abnormality
  - ETT suggests ischemia
  - EKG is uninterpretable
  - Any indication in section **Stress Testing with Imaging (CD-1.4)** in the Cardiac Imaging Guidelines

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Coding

Initial pediatric TTE combinations

CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
CPT® 93303, CPT® 93320, and CPT® 93325
CPT® 93303, CPT® 93306
CPT® 93306 (CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately)

Codes	Description
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;

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Codes	Description
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection

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Evidence Discussion

Ford et al. (2022) identified syncope or near-syncope, particularly when exertional, as a sign or symptom suggesting possible cardiac disease, including aortic stenosis, hypertrophic cardiomyopathy, or anomalous coronary artery origin. The review supports selective cardiology referral and cardiac imaging when syncope is associated with pathologic murmur features, abnormal cardiovascular examination, concerning family history, exertional symptoms, or other cardiac signs. Dorfman et al. (2022) supports CMR as a selected modality when syncope raises concern for cardiomyopathy, arrhythmogenic substrate, myocarditis, coronary disease, or structural abnormalities not fully characterized by echocardiography.

Syncope in pediatric individuals is common, with up to 15% of individuals experiencing at least one episode by age 21. Syncope is caused by neurocardiogenic syndrome (vasovagal syncope) in 75% to 80% of cases, which is a benign and self-limiting condition. Despite this, syncope causes great anxiety for parents resulting in requests for testing.

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Kawasaki Disease

Guideline

Kawasaki Disease (KD) (PEDCD-6)
References (PEDCD-6)

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Kawasaki Disease (KD) (PEDCD-6)

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Kawasaki Disease Initial Imaging (PEDCD-6.1)

Criteria

- TTE is considered medically necessary for initial assessment of suspected or known Kawasaki disease.
  - CCTA (CPT® 75574), CMR without contrast (CPT® 75557), CMR without and with contrast (CPT® 75561), or MRA Chest (CPT® 71555) is considered medically necessary when TTE is inconclusive or suboptimal or for coronary artery abnormalities.
  - MRA or CTA (contrast as requested) of the affected body area is considered medically necessary for evaluation of signs or symptoms suggesting aneurysm development.

Kawasaki Disease - Acute Phase (PEDCD-6.2)

Criteria

- TTE is considered medically necessary in the acute phase of KD as follows:
  - In uncomplicated presentations at the following intervals after treatment:
    - Within 1 to 2 weeks
    - Within 4 to 6 weeks
  - Twice per week or more when there are evolving coronary artery abnormalities (z-score >2.5) detected during the acute illness until luminal dimensions have stopped progressing.
  - At the following intervals when there are expanding large or giant aneurysms:
    - Twice per week while dimensions are expanding rapidly
    - Once weekly after dimension is stabilized for the first 45 days of illness
    - Then, monthly until the third month after illness onset
- CCTA, or CMR, or coronary angiography is considered medically necessary in the acute phase in severe cases to evaluate proximal coronary artery abnormalities when results will impact management decisions.
- TEE, CMR, and CCTA are considered medically necessary when **both**:
  - Visualization of the coronary arteries with TTE is inadequate **and**
  - Results will impact immediate management decisions.

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- TTE is considered medically necessary when atypical KD is being considered.
- Repeat TTE is considered medically necessary when treatment decisions will be affected by results (e.g., treating with intravenous immunoglobulin (IVIg)), or when new signs or symptoms (such as typical peeling) develop.

Kawasaki Disease - Chronic Phase Imaging Criteria (PEDCD-6.3)

Criteria

Symptomatic individuals

- TTE is considered medically necessary at any time with new or progressing cardiac symptoms.
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) is considered medically necessary when there are new or progressing symptoms of ischemia or ventricular dysfunction
- Diagnostic heart catheterization or imaging coronary angiography (CTA or MRA) is considered medically necessary when the above studies are positive, inconclusive, or otherwise lead to a conclusion that intervention is needed.

Long-term routine surveillance in asymptomatic imaging for Kawasaki disease

AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
All			All risk levels 4-6 weeks after acute illness		
1	Normal	Normal	One echo 2-12 months after acute illness	none	none
2	Dilation	Dilation	6 months One year If dilation remains echo every 2-5 years until resolves	none	none

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AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
		Normal	After acute illness: 2-12 months One echocardiogram at one year No echocardiogram after one year		
3.1	Small	Small	6 months 12 months then yearly	3 to 5 years	CCTA at 1 year then every 3-5 years
3.2	Small	Normal or dilated	12 months Then every 5 years	3-5 years	CCTA at 1 year then with inducible ischemia on stress imaging
4.1	Medium	Medium	3 months 6 months 12 months Every 6-12 months after that	2 to 5 years	CCTA at 1 year then every 2-5 years
4.2	Medium	Small	6 months and 12 months, every 1 year	3 to 5 years	CCTA at 1 year then every 3-5 years

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AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
4.3	Medium	Normal Or Dilated	6 months and 12 months then every 2 years	4 to 5 years	6 months and 12 months then if inducible ischemia on stress imaging
5.1	Large	Large	1 month 3 months 6 months 9 months 12 months Then every 6 to 12 months	6-12 months	CCTA or cardiac catheteriza-tion at 2-6 months then every 1-5 years
5.2	Large	Medium	3 months 6 months 9 months 12 months Then every 6-12 months	2 to 5 years	CCTA at 1 year then every 2-5 years
5.3	Large	Small	3 months 6 months 9 months 12 months Every 12 months	2 to 5 years	CCTA at 1 year then every 2-5 years

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AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
5.4	Large	Normal Or Dilation	3 months 6 months 9 months 12 months Every 1-2 years	3-5 years	CCTA at 1 year then every 3-5 years

**Adapted from: Jone, P. N., Tremoulet, A., Choueiter, N., Dominguez, S. R., Harahsheh, A. S., Mitani, Y., Zimmerman, M., Lin, M. T., Friedman, K. G., & American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee of the Council on Lifelong Congenital Heart Disease and Heart Health in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; and Council on Clinical Cardiology (2024). Update on Diagnosis and Management of Kawasaki Disease: A Scientific Statement From the American Heart Association. Circulation, 150(23), e481–e500. https://doi.org/10.1161/CIR.0000000000001295

Evidence Discussion

Acute Phase

- The acute phase of Kawasaki disease (KD) can last up to 4-6 weeks from the onset of fever until acute systemic inflammation has resolved and coronary artery dimensions are no longer expanding.
- Based on AHA recommendations, the following classifications are used in risk stratification of coronary artery abnormalities (McCrindle et al. 2017):
  - Z-score classification accounts for the effects of body size and age through use of baseline coronary dimensions adjusted for body surface area. The z-score value represents the number of standard deviation above the mean. (e.g., z=0 pt. has coronary artery dimension value equal to mean, z=2 person has value 2 standard deviation above the mean, based on age, gender, BSA).
  - Coronary Artery Abnormalities Risk Classification based on z-score:
    - 1 - No involvement at any time point (z-score always <2)
    - 2 - Dilation only (z-score 2 to <2.5)
    - 3 - Small aneurysm (z-score ≥2.5 to <5)

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        - 3.1 - Current or persistent
        - 3.2 - Decreased to dilation only or normal luminal dimension
      - 4 - Medium aneurysm (z-score ≥5 to <10, and absolute dimension <8 mm)
        - 4.1 - Current or persistent
        - 4.2 - Decreased to small aneurysm
        - 4.3 - Decreased to dilation only or normal luminal dimension
      - 5 - Large and giant aneurysm (z-score ≥10, or absolute dimension ≥8 mm)
        - 5.1 - Current or persistent
        - 5.2 - Decreased to medium aneurysm
        - 5.3 - Decreased to small aneurysm
        - 5.4 - Decreased to dilation only or normal luminal dimension
    - Additional clinical features that may increase the long-term risk of myocardial ischemia:
      - Greater length and distal location of aneurysms that increase the risk of flow stasis
      - Greater total number of aneurysms
      - Greater number of branches affected
      - Presence of luminal irregularities
      - Abnormal characterization of the vessel walls (calcification, luminal myofibroblastic proliferation)
      - Presence of functional abnormalities (impaired vasodilation, impaired flow reserve)
      - Absence or poor quality of collateral vessels
      - Previous revascularization performed
      - Previous coronary artery thrombosis
      - Previous myocardial infarction
      - Presence of ventricular dysfunction

Chronic Phase

- Long-term management begins at the end of the acute illness, usually at 4 to 6 weeks after fever onset. Management is based on two pieces of data:
  - The dimensions of the largest aneurysm at any point during the disease
  - The dimensions of the largest current aneurysm
- Additional risk factors considered for imaging:
  - Greater length and distal location of aneurysms that increase the risk of flow stasis
  - Greater total number of aneurysms
  - Greater number of branches affected
  - Presence of luminal irregularities

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- Abnormal characterization of the vessel wall (calcification, luminal myofibroblastic proliferation)
- Presence of functional abnormalities (impaired vasodilation, impaired flow reserve)
- Absence or poor quality of collateral vessels
- Previous revascularization performed
- Previous coronary artery thrombosis
- Previous myocardial infarction
- Presence of ventricular dysfunction
- Long term routine surveillance in asymptomatic imaging for Kawasaki disease-see chart

Kawasaki disease (KD) is an acute systemic vasculitis of childhood and remains a clinical diagnosis because no single diagnostic test is pathognomonic. Diagnosis is based on the presence of characteristic clinical features, supplemented by laboratory findings and echocardiography, particularly when presentation is incomplete. Early recognition is critical because timely treatment reduces the risk of coronary artery aneurysm formation. Current American Heart Association (AHA) and American College of Radiology (ACR) guidance define complete KD as fever for at least 5 days accompanied by at least four of five principal clinical features: (1) bilateral non-exudative conjunctival injection, (2) oral mucosal changes such as cracked lips, strawberry tongue, or oropharyngeal erythema, (3) polymorphous rash, (4) extremity changes including erythema or edema of the hands and feet or later periungual desquamation, and (5) cervical lymphadenopathy ≥1.5 cm, typically unilateral. Diagnosis may also be established with fewer days of fever when classic features are strongly present and clinical suspicion is high. Clinical manifestations often develop sequentially, making a thorough history essential.

The 2024 AHA Kawasaki Disease Scientific Statement further supports long-term imaging surveillance in patients with coronary artery aneurysms or persistent coronary abnormalities. Echocardiography remains first-line imaging, while CTA and CMR are increasingly used for assessment of stenosis, thrombosis, ischemia risk, and long-term coronary remodeling. Higher-risk patients with medium, large, or giant coronary aneurysms require substantially more intensive surveillance (Jone et al., 2024)..

Coding

Code	Description
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)

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Code	Description
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

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Pediatric Pulmonary Hypertension

Guideline

Pediatric Pulmonary Hypertension General (PEDCD-7.1)
References (PEDCD-7)

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Pediatric Pulmonary Hypertension General (PEDCD-7.1)

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Criteria

The following imaging is considered medically necessary in the evaluation of pulmonary hypertension (PH):

- TTE for the initial evaluation of PH
- CT Chest and CTA Chest or CMR and MRA Chest for initial evaluation of PH
- Right and/or left heart catheterization on initial diagnosis of PH
- Repeat TTE is as follows:
  - every 4 to 6 months after initial evaluation
  - at any time for new or worsening symptoms
  - to evaluate a recent change in therapy
- CMR when TTE is inconclusive or suboptimal, or to monitor right ventricular function during follow-up
- Right heart and/or left heart catheterization is considered medically necessary before and after initiation of PH-targeted therapy, or for evaluation of individuals with concomitant congenital heart disease.

Coding

Code	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;

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Code	Description
93303	Transthoracic echocardiography for congenital cardiac anomalies; complete
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
+93320	Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); complete
+93325	Doppler echocardiography color flow velocity mapping (List separately in addition to codes for echocardiography)

Background and Supporting Information

Pulmonary hypertension in children can be caused by cardiac, pulmonary, or systemic diseases, and idiopathic disease occurs as well.

Repeat echocardiography intervals are variable depending on age of individual, etiology, and severity. CT Chest is considered medically necessary for the initial evaluation of all pediatric individuals with pulmonary hypertension to evaluate for pulmonary vascular or interstitial disease, or other intrathoracic cause.

Evidence Discussion

Pulmonary vascular disease remains one of the most important determinants of morbidity in congenital left-to-right shunt lesions. Contemporary pediatric pulmonary hypertension guidance and congenital heart disease literature demonstrate that delayed repair of significant ASD, VSD, PDA, and AVSD lesions may lead to progressive pulmonary vascular remodeling and, ultimately, irreversible pulmonary hypertension or Eisenmenger physiology (Sachdeva et al., 2026).

Evidence consistently supports escalation of evaluation when right-to-left shunting develops, pulmonary artery pressures rise, or clinical findings suggest elevated pulmonary vascular resistance. Cardiac catheterization remains the reference standard for definitive characterization of pulmonary vascular disease and operability assessment. The recently published ACC guidance on pediatric left-to-right shunt lesions emphasizes consideration of more intensive follow-up in patients demonstrating evidence of pulmonary vascular involvement. (Sachdeva et al., 2026).

Current evidence supports CMR for reproducible assessment of RV remodeling and function, blood flow, ventricular interaction, longitudinal change, and selected prognostic

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markers in pediatric PH. CT is supported for targeted evaluation of pulmonary vascular, venous, airway, and parenchymal abnormalities that may cause, characterize, or complicate PH. Neither modality replaces echocardiography for initial screening or cardiac catheterization for definitive hemodynamic diagnosis and treatment planning. Use should be individualized according to the clinical question, expected effect on management, need for sedation, and risks associated with ionizing radiation or contrast exposure. Although multiple sources support the clinical value of advanced imaging, pediatric prognostic thresholds remain incompletely validated and much of the evidence is derived from observational studies and expert consensus (Latus et al., 2016; Latus & Meierhofer, 2021; Miles et al., 2026).

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Echocardiography

Guideline

Echocardiography General Indications
References (PEDCD-8)

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Echocardiography General Indications

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Initial Transthoracic Echocardiography (TTE) Indications (PEDCD-8.2)

Criteria

- In addition to the criteria listed in previous guideline sections, initial TTE evaluation is considered medically necessary as follows:
  - Signs/symptoms suspected to be cardiac including (but not limited to) central cyanosis, dyspnea, edema, poor peripheral pulses, feeding difficulty, decreased urine output, hepatomegaly, or desaturation on pulse oximetry
  - Abnormal EKG or cardiac biomarkers
  - Abnormal chest x-ray suggesting cardiovascular disease
  - Documentation of any pathologic murmur
  - Any murmur with associated cardiac signs or symptoms
  - First-degree relative with any of the following before age 50:
    - Sudden cardiac arrest or death
    - Pacemaker or implantable defibrillator placement
    - First-degree relative with cardiomyopathy
  - Supraventricular Tachycardia (SVT), Ventricular Tachycardia, or Premature Ventricular Contractions (PVCs)
  - Known or suspected valvular dysfunction
  - Persistent systemic hypertension
  - Individuals with new onset hypertension
    - TTE indicated to assess for cardiac target organ damage (LV mass, geometry, and function) at the time of consideration of pharmacologic treatment of systemic hypertension
  - Obesity (BMI >30) with additional cardiovascular risk factors
  - Stroke
  - Renal failure
  - Preoperative evaluation of individuals with chest wall deformities or scoliosis
  - Known or suspected vascular ring
  - Planned administration of cardiotoxic chemotherapy
    - Generally anthracyclines (doxorubicin, daunorubicin, mitoxantrone, idarubicin, epirubicin)

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- Planned radiation therapy involving heart muscle or hematopoietic stem cell transplant
- Sickle cell disease or other hemoglobinopathy causing chronic anemia
- Known or suspected vasculitis, acute rheumatic fever, or other systemic autoimmune disease
- Aortopathy (e.g., Marfan, Ehlers-Danlos, Loeys-Dietz)
  - Positive personal diagnosis
  - First-degree relative
  - Positive gene
  - Finding suggestive of aortopathy such as x-ray showing aortic dilation
- Muscular dystrophy
  - Positive personal diagnosis
  - First-degree relative
  - Positive gene
  - Any findings suggestive of MD, such as neurological exam
- Cardiomyopathy
  - Diagnosed by other modality (e.g., CMR)
  - First-degree relative
  - Positive genetic testing
  - Findings suggestive of, such as cardiomegaly on x-ray
- Metabolic, mitochondrial, and storage disorders
  - Positive personal diagnosis
  - First-degree relative
  - Positive genetic testing
  - Findings suggestive of on exam or lab findings
- Abnormalities of cardiac or other viscera situs
- Signs, symptoms, or blood culture suggestive of endocarditis
- Known or suspected mass lesion involving the heart or great vessels
- Known or suspected clot in atrium or ventricle
- Known or suspected pulmonary hypertension
- Known or suspected pericardial effusion
- Complications during prenatal development:
  - Known or suspected cardiovascular abnormality on fetal echocardiogram
  - Maternal phenylketonuria (PKU)
  - Maternal diabetes with no fetal echo
  - Maternal teratogen exposure
  - Maternal infection during pregnancy with potential cardiac sequelae
- Genetic abnormality known to be associated with cardiovascular disease such as:
  - Down syndrome

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        - Turner syndrome
        - 22q11 deletion syndrome
        - Williams syndrome
        - Noonan syndrome
    - First-degree relative family history of:
        - Unexplained sudden death before age 50
        - Hypertrophic cardiomyopathy
        - Non-ischemic dilated cardiomyopathy
        - Genetic abnormality known to be associated with cardiovascular disease
        - Congenital left-sided heart lesion
        - Heritable pulmonary arterial hypertension

Coding considerations

- Providers performing an **initial** echocardiogram on a pediatric individual may not know what procedure codes they will be reporting until the initial study is completed.
    - If congenital heart disease is found on the initial echo, a complete echocardiogram is reported with codes CPT® 93303, CPT® 93320, and CPT® 93325 because CPT® 93303 does NOT include Doppler and color flow mapping.
    - If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2-D, Doppler and color flow mapping.
- Since providers may not know the appropriate code(s) that will be reported at the time of the study, they may request multiple codes.
    - The following echocardiography code combinations for any **initial** echocardiogram:
        - CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
        - CPT® 93303, CPT® 93306
        - CPT® 93306 CPT® 93320 and CPT® 93325 are included with CPT® 93306
    - Post-service audits may be completed to ensure proper claims submission.
- Correct coding for subsequent echocardiograms
    - If an individual is being followed for known congenital heart disease, and an echocardiogram is considered medically necessary, the appropriate codes are (CPT® 93303 or 93304) in addition to appropriate doppler codes (CPT® 93320 or 93321) and CPT® 93325.
    - If an individual has documented normal anatomy or acquired heart disease, and an echocardiogram is considered medically necessary, non-congenital codes are appropriate CPT® 93306 (includes all Doppler codes) or CPT® 93308 with CPT® 93321 and CPT® 93325.
    - For individuals with newborn physiology (e.g., ASD versus PFO, or PDA), the final echocardiogram that documents normal anatomy can be coded as congenital. However, any subsequent echocardiograms after that, which would be completed for a new indication, (e.g., shortness of breath) would be coded as non-congenital.

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Repeat Transthoracic Echocardiography Indications (PEDCD-8.3)

Criteria

In addition to criteria listed in previous guideline sections, repeat TTE is considered medically necessary as follows:

- In an individual with known cardiac disease and a previously normal echocardiogram when there is documentation of any of the following:
  - New or worsening cardiac symptoms
  - New EKG abnormality
  - Newly recognized family history suggestive of heritable heart disease
- In an individual with prior normal evaluation
  - New or worsening symptoms
  - New EKG finding
  - New murmur
  - New finding of inheritable disease in first-degree relative
- Individuals with first-degree family history of cardiomyopathy (e.g., hypertrophic, dilated, arrhythmogenic) or aortopathy
  - Repeat echocardiogram every 12 months
  - Repeat echocardiogram is considered medically necessary at the additional intervals when the family history or gene mutation is associated with neonatal or fetal disease:
    - At birth
    - Within the first 6 weeks
    - At 3 months
    - At 6 months
    - At one year
    - Then yearly
  - Repeat imaging is considered **not** medically necessary in individuals with first degree relative with known mutation when **both** of the following apply:
    - Individual has been tested and does not have that mutation.
    - Individual has a normal echocardiogram.
  - If there are abnormal findings on screening/surveillance imaging, a repeat echocardiogram is allowed to assess stability of findings.
- Individual with a phenotype positive cardiomyopathy (with or without a positive gene) can be imaged as follows:
  - Infants (under one year)
    - TTE is considered medically necessary at frequency requested by pediatric cardiology or provider in consultation with pediatric cardiology.

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- Children (over one year) yearly testing is considered medically necessary as follows:
  - Repeat TTE every 12 months
  - Repeat TTE to assess stability at discretion of pediatric cardiology, or provider in consultation with pediatric cardiology, after any new or changed clinical finding
  - TTE at any time with documented new or changing symptoms
- Individual with a known mutation associated with cardiomyopathy or aortopathy and no previous abnormal imaging
  - Repeat echocardiogram every 12 months
    - In individuals whose gene mutation is associated with neonatal or fetal disease or there is a family history of neonatal or fetal disease, repeat echocardiogram is considered medically necessary at the following intervals:
      - At birth
      - Within the first 6 weeks
      - Then at 3 months
      - At 6 months
      - At one year
      - Then yearly
  - If there are abnormal findings on screening/surveillance imaging, a repeat echocardiogram is considered medically necessary to assess stability of findings.
- Individuals who are status post heart transplant can have echocardiograms repeated as often as requested by heart transplant team.
- Every 12 months for individuals receiving active therapy for ventricular hypertrophy, valvular dysfunction, cardiomyopathy
  - One time repeat TTE can be approved at 6 months to assess response to a change in therapy.
- Every 12 months for individuals with chronic pericardial effusions
- Every 12 months routine surveillance in asymptomatic individuals with muscular dystrophy (may be replaced by cardiac MRI CPT® 75557 or 75561 at 6 years of life)
- Every 12 months for sickle cell disease or other hemoglobinopathy causing chronic anemia and one of the following:
  - High-risk genotype (HbSS or HbSβ^0, severe thalassemia, etc.)
  - History of acute chest syndrome or intrinsic lung disease
  - History of stroke
  - Receiving chronic transfusion therapy
- As needed for monitoring cardiotoxicity during chemotherapy administration
- TTE follow-up for systemic hypertension

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- In individuals with evidence of end organ damage (includes LVH, or decreased LVEF) TTE is considered medically necessary every 6 months until echocardiogram normalizes.
- Individuals without LV target organ injury (no LVH, normal LVEF) at initial echocardiographic assessment, repeat echocardiography at yearly intervals is considered medically necessary in those with persistent hypertension (stage 2 HTN, or chronic stage 1 HTN incompletely treated (noncompliance or drug resistance).

Transthoracic Echocardiography (TTE) Coding

- CPT® codes for echocardiography are listed in **General Guidelines (PEDCD-1.0)**

Echocardiogram coding notes	CPT®
• The most commonly performed study is a complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306). ◦ CPT® 93306 includes CPT® 93320 and CPT® 93325, so those codes should not be approved along with CPT® 93306.	93306
• Doppler codes (CPT® 93320, CPT® 93321, and CPT® 93325) are add-on codes and are assigned in addition to code for the primary procedure, and should not be approved alone.	+93320 +93321 +93325
• For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307.	93307
• A limited transthoracic echocardiogram is reported with CPT® 93308. ◦ Limited transthoracic echocardiogram should be billed if the report does not “evaluate or document the attempt to evaluate” all of the required structures. ◦ Unlike CPT® 93306, the Doppler CPT® 93321 and CPT® 93325 are not included with CPT® 93308. ◦ CPT® 93321 (not CPT® 93320) should be reported with CPT® 93308 if Doppler is included in the study. ◦ CPT® 93325 should also be reported with CPT® 93308 if color flow Doppler is included in the study.	93308
• For individuals with known congenital heart disease, a limited transthoracic echocardiogram is reported with CPT® 93304, +/- CPT® 93321 and CPT® 93325.	93304

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Transesophageal Echocardiography (TEE) (PEDCD-8.4)

Criteria

TEE (CPT® 93312, 93320, and 93325) is considered medically necessary when there is documentation of **any** of the following:

- limited transthoracic echo window when further information is needed to guide management (e.g., suspected or confirmed endocarditis, suspected intracardiac mass, etc.)
- assessing valvular dysfunction, especially mitral regurgitation when TTE is inadequate and intervention is being considered to repair/replace valve
- evaluation of cardiac mass, suspected tumor, or thrombus
- pre-procedural assessment of PFO/ASD
- pre-operative evaluation prior to planned LVAD implant
- embolic source or intracardiac shunting when TTE is inconclusive
  - Examples: atrial septal defect, ventricular septal defect, patent foramen ovale, aortic cholesterol plaques, thrombus in cardiac chambers, valve vegetation, tumor
- embolic events when there is an abnormal TTE or a history of atrial fibrillation
  - clarify atria/atrial appendage, aorta, mitral/aortic valve beyond the information that other imaging studies have provided
- cardiac valve dysfunction
  - differentiation of tricuspid from bicuspid aortic valve in setting of aortic enlargement or significant stenosis or significant regurgitation
  - congenital abnormalities
- assessing for left atrial thrombus prior to cardioversion of atrial fibrillation or atrial flutter
- assessing for left atrial thrombus prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure
- for initial imaging of ascending and descending thoracic aortic aneurysms
- For repeat imaging of established thoracic aneurysms, TEE is medically necessary **only** when imaging with CT or MR is contraindicated.
- TEE is medically necessary for the evaluation of individuals with hypertrophic cardiomyopathy if TTE is inconclusive for **any** of the following:
  - mitral regurgitation secondary to structural abnormalities of the mitral valve
  - subaortic membrane or aortic valve stenosis
- pre-procedure planning for surgical myectomy or alcohol septal ablation
- Left atrial appendage (LAA) Closure device for any of the following:
  - pre-procedural evaluation
  - repeat imaging 45 days post-procedure

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- Another follow-up study is medically necessary before the 1-year surveillance when the imaging study at 45 days shows a peri-device gap ≥5 mm or Device Related Thrombus usually at 3-6 months.

- 1 year post-procedure

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Magnetic Resonance Imaging

Guideline

MR Imaging (PEDCD-9)
References (PEDCD-9)

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MR Imaging (PEDCD-9)

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Indications for Cardiac MRI (CMR) (PEDCD-9.3)

Criteria

- In addition to the criteria listed in previous guideline sections, CMR (CPT® 75557 or 75561) is considered medically necessary when a recent TTE is inconclusive or suboptimal as follows:
  - Assess global ventricular function and mass when results are needed for treatment planning
  - in complex congenital heart disease (i.e., TOF, single ventricle, truncus arteriosus, TGA) to evaluate structures, function, or residual lesions for baseline surveillance planning or during establishment of adult congenital heart disease care. Once these individuals reach age 19, they can be imaged by adult congenital heart disease guideline
  - further evaluate clinical suspicion of arrhythmogenic right ventricular dysplasia (ARVD) or arrhythmogenic cardiomyopathy (ARVC)
  - in pericardial disease (including constrictive pericarditis, restrictive pericarditis, and perimyocarditis),to further evaluate possible constriction or restriction
    - MRI without and with contrast (CPT® 75561)
  - evaluate cardiac tumor or mass
    - MRI without and with contrast (CPT® 75561)
  - evaluate anomalous coronary artery
    - MRI without and with contrast (CPT® 75561) or CCTA (CPT® 75574)
  - in Fabry disease to assess the effect of enzyme replacement therapy
    - MRI without and with contrast (CPT® 75561)
  - to characterize the myocardium (CPT® 75557 or 75561) in congenital cardiomyopathy (muscular dystrophy, glycogen storage disease, fatty acid oxidation disorders, mitochondrial disorders, etc.) or unexplained cardiomyopathy
- Stress-perfusion CMRCardiac stress perfusion study (CPT® 75559 or CPT® 75563) is considered medically necessary when there is a concern for ischemia as follows:
  - assess the functional relevance of anomalous coronary artery
  - Kawasaki disease with coronary artery aneurysms
  - TGA after arterial switch
  - Ross procedure

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- when an exercise stress test (EST) without imaging is considered medically necessary but the individual is not able to perform an EST
- when an EST is equivocal, positive, or there is concern for a false negative

- Assessment of cardiac iron overload such as in hemochromatosis, thalassemia, sickle cell (either CPT® 75557 or CPT® 71550, T2* MRI, contrast not necessary)
  - Screening imaging is considered medically necessary every 12 months.
  - Imaging is considered medically necessary every 3 months for treatment response in individuals receiving active treatment (chelation +/- phlebotomy).
  - Frequently performed along with MRI Abdomen (CPT® 74181) to assess liver iron deposition (see **Transfusion-associated (Secondary) Hemochromatosis (PEDAB-18.2)** in the Pediatric Abdomen Imaging Guidelines)
- Asymptomatic individuals with Duchenne Muscular Dystrophy (DMD)
  - MRI Cardiac is considered medically necessary for surveillance in place of TTE every year starting at 6 years of age.
  - Female carriers should be imaged according to general Cardiac Imaging Guidelines.
  - CPT® 75565 or CPT® 71555 are considered **not** medically necessary for asymptomatic surveillance of DMD.

Myocarditis

CMR is considered medically necessary for evaluation of pediatric myocarditis as follows:

- when there is documented clinical suspicion for myocarditis (i.e., abnormal biomarkers, ECG findings, arrhythmia, ventricular dysfunction, persistent symptoms)
- TTE is abnormal or inconclusive.
- Additional tissue characterization is needed for treatment planning.

MRA Chest for Congenital Heart Disease (PEDCD-9.4)

Criteria

- For Familial Aortopathies, see **Thoracic Aortic Disease (PEDPVD-4.1)** in the Pediatric Peripheral Vascular Disease Imaging Guidelines.
- For individuals with known CHD for routine imaging, see **Imaging and Surveillance per Congenital lesion (PEDCD-2.4)**.
- For individuals who have both cardiac and ascending aorta abnormalities (e.g., truncus arteriosus), the following studies are considered medically necessary following an inconclusive TTE:
  - Cardiac MRI (CPT® 75557 or CPT® 75561)
  - And MRI Chest (CPT® 71552) or MRA Chest (CPT® 71555) if aorta is involved

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- For individuals with aortic abnormalities without cardiac abnormalities (i.e. normal intracardiac anatomy, but coarctation or peripheral pulmonary artery stenosis), the following studies are considered medically necessary following an inconclusive TTE:
  - MRI Chest (CPT® 71552)
  - MRA Chest (CPT® 71555)
- MRA Chest (CPT® 71555) is considered medically necessary for individuals with cardiomyopathy or isolated abnormal intracardiac anatomy, when there are inconclusive images on echocardiogram related to chest vessels (e.g. aortic arch, pulmonary arteries, pulmonary veins, systemic veins).

Evidence Discussion

The peer-reviewed published literature and recent professional guidance support cardiac magnetic resonance imaging (CMR) as an important noninvasive adjunct in the evaluation of pediatric patients with suspected or known myocarditis when clinical findings, biomarkers, electrocardiography, or echocardiography suggest myocardial involvement. The 2024 American College of Cardiology (ACC) Expert Consensus Decision Pathway, published in Journal of the American College of Cardiology in 2025, states that CMR provides valuable diagnostic information in myocarditis by characterizing myocardial edema, hyperemia, necrosis, fibrosis, pericardial inflammation, and left ventricular dysfunction (Drazner et al., 2025).

Pediatric-focused evidence also supports CMR as a key modality for myocardial tissue characterization. A 2023 systematic review and meta-analysis of quantitative CMR parameters in children and adolescents with myocarditis found that native myocardial T1 mapping was significantly higher in pediatric myocarditis compared with healthy controls, supporting the diagnostic value of CMR mapping techniques in this population (Yao et al., 2023). However, the review also reported less consistent differences for some other parameters, including early gadolinium enhancement ratio, T2-weighted ratio, and T2 mapping, indicating that CMR findings should be interpreted in the context of the full clinical picture and that diagnostic performance may vary by technique, disease timing, and study methodology (Yao et al., 2023).

Recent society guidance further strengthens the policy rationale for CMR in selected pediatric patients. The 2025 European Society of Cardiology (ESC) Guidelines for the management of myocarditis and pericarditis, endorsed by the Association for European Paediatric and Congenital Cardiology, present a structured diagnostic framework for inflammatory myocardial and pericardial syndromes and refine the role of multimodality imaging, including CMR, in diagnosis and management (Schulz-Menger et al., 2025).

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Cardiac MRI Coding (PEDCD-9.2)

Code	Description
	CMR
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
	MRI Chest
71550	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s)
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)

- Only one procedure code from the set: CPT® 75557, CPT® 75559, CPT® 75561, and CPT® 75563 should be reported per session.
- Only one flow velocity measurement (CPT® +75565) should be reported per session.

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Pericardial Effusion or Pericardial Tamponade

Guideline

Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade (PEDCD-9.5)
References (PEDCD-9.5)

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Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade (PEDCD-9.5)

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Criteria

- TTE is considered medically necessary to evaluate pericardial effusions or diagnose pericardial tamponade.
- Contrast-enhanced CMR is considered medically necessary when results will effect clinical management to evaluate any of the following conditions:
  - Pericarditis
  - Neoplastic effusion (e.g., metastatic cancer to the pericardium or myocardium including lung, breast, renal cell, lymphoma and melanoma)
  - Tamponade
  - Myocardial infiltration
  - to answer a clinical question left unanswered by another recent imaging study

Evidence Discussion

Evidence supports the use of transthoracic echocardiography as the initial imaging study for evaluation of suspected pericardial effusion and cardiac tamponade because it rapidly identifies pericardial fluid, assesses ventricular function, and evaluates hemodynamic compromise (Schulz-Menger et al, 2025). The evidence also supports the use of contrast-enhanced cardiac MRI when a specific clinical question remains unanswered by recent imaging and the results are expected to affect management. In this setting, CMR is useful for the evaluation of pericarditis, cardiac tamponade with associated pericardial pathology, myocardial infiltration, and neoplastic involvement of the pericardium or myocardium, including malignant effusions associated with lung, breast, renal cell, lymphoma, and melanoma malignancies (Schulz-Menger et al., 2025)

Coding

Code	Description
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;

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Code	Description
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography

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Computed Tomography

Guideline

Cardiac Indications for CT (PEDCD-10)
References (PEDCD-10)

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Cardiac Indications for CT (PEDCD-10)

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CCTA Criteria (PEDCD-10.3)

Criteria

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- In addition to the criteria listed in previous guideline sections, CCTA is considered medically necessary for any of the following, when a recent TTE and/or MRI is inconclusive:
  - Persistent exertional chest pain and normal stress test
  - Full sibling(s) with history of sudden death syndrome before age 30 or with documented anomalous coronary artery
  - Resuscitated sudden death and contraindication to conventional coronary angiography
  - Unexplained new onset of heart failure if CCTA will replace conventional invasive coronary angiography
  - Documented ventricular tachycardia (6 beat runs or greater) if CCTA will replace conventional invasive coronary angiography
  - Equivocal coronary artery anatomy on conventional cardiac catheterization
  - In infants: otherwise unexplained dyspnea, tachypnea, wheezing, episodic pallor, irritability, sweating, poor feeding, and/or failure to thrive
    - The presence of other congenital heart disease is not a separate indication for CCTA to rule out anomalous coronary artery (except when coronary artery surgery is pending, i.e., Transposition of the great arteries, Tetralogy of Fallot, Truncus arteriosus, aortic root surgery)
  - Evaluation of the arterial supply and venous drainage in children with bronchopulmonary sequestration

Cardiac CT Structure and Morphology (PEDCD-10.4)

Criteria

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- In addition to the criteria listed in previous guideline sections, CCT is considered medically necessary for any of the following, when a recent TTE and/or MRI is inconclusive:

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- Cardiac or pericardial mass
- Pericarditis
- Complications of cardiac surgery or evaluation of post-operative anatomy
- Cardiac thrombus in individuals with technically limited TTE, TEE, or CMR
- Clinical suspicion of arrhythmogenic right ventricular dysplasia (ARVD) or arrhythmogenic cardiomyopathy (ARVC)
- Native aortic abnormalities if echocardiogram is indeterminate
- Intracardiac anatomy unclear after TTE or CMR
- A CTA Chest is considered medically necessary during a Cardiac CT if there are issues regarding the chest vessels that are inconclusive after echocardiogram or CMR

CTA Chest with CT Cardiac (CCT) or CTA Cardiac (CCTA) (PEDCD-10.5)

Criteria

CPT® 71275

- CTA Chest is considered medically necessary in individuals who require CCT or CCTA when:
  - A TTE or MRI is inconclusive for issues regarding chest vasculature
  - Routine imaging is considered medically necessary based on **Imaging and Surveillance per Congenital lesion (PEDCD-2.4)**

Evidence Discussion

Evidence supports cardiac computed tomography (CCT), including cardiac CT angiography, for defining complex cardiovascular anatomy, coronary artery abnormalities, extracardiac vascular structures, and postoperative complications in children with congenital or acquired heart disease, although evidence remains limited for demonstrating improved long-term clinical outcomes compared with other imaging modalities. Contemporary reviews and scientific statements indicate that CCT provides rapid image acquisition and high spatial resolution at the elevated heart rates commonly encountered in children and may reduce the need for sedation or anesthesia compared with cardiovascular magnetic resonance (CMR). These advantages are particularly relevant when echocardiographic findings are incomplete, CMR is contraindicated or nondiagnostic, or detailed evaluation of the coronary arteries, systemic or pulmonary veins, great vessels, conduits, shunts, or surgically altered anatomy is required (Kulkarni et al., 2016; Sachdeva et al., 2024; Secinaro et al., 2019).

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Evidence also supports use of Cardiac CT for selected pediatric patients with congenital or acquired heart disease, particularly when detailed coronary or extracardiac vascular anatomy is needed, echocardiography is incomplete, CMR is contraindicated or likely to require sedation, or rapid imaging is clinically important. The evidence is stronger for diagnostic accuracy, anatomic delineation, and procedural planning than for longitudinal surveillance, routine ventricular functional assessment, or improvement in long-term health outcomes. Use of CT should include a specific clinical indication, consideration of echocardiography and CMR, pediatric dose optimization, and use of the lowest radiation exposure capable of producing diagnostic image quality. The cumulative radiation burden and risks associated with iodinated contrast should be weighed against the expected diagnostic and management benefits for each patient (Hill et al., 2017; Krishnamurthy et al., 2023; Sachdeva et al., 2024)

Guideline and consensus statements from the American College of Radiology, Image Gently Alliance, and Society of Cardiovascular Computed Tomography recognize CCT as an appropriate complementary modality for selected congenital and acquired pediatric heart conditions. These recommendations emphasize that each examination should address a defined clinical question, be expected to provide information that cannot be obtained adequately through a lower-risk modality, and have a reasonable likelihood of affecting clinical management. Echocardiography generally remains the first-line examination, while CMR is preferred when comprehensive ventricular function, blood flow, perfusion, or tissue characterization is required and can be obtained safely and effectively (Fogel et al., 2022; Han et al., 2015; Hill et al., 2017; Krishnamurthy et al., 2023).

Coding

Codes	Description
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)

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Diagnostic Heart Catheterization

Guideline

Cardiac Catheterization Additional Criteria (PEDCD-11.2)
References (PEDCD-11)

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Cardiac Catheterization Additional Criteria (PEDCD-11.2)

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Criteria

In addition to the condition specific sections in this guideline, diagnostic heart catheterization is considered medically necessary for any of the following conditions:

- Other advanced imaging has failed to resolve a clinical issue and results will impact clinical management (e.g., a catheterization to assess ventricular pressures and shunt to determine if VSD surgery is required).
- Preoperative assessment in complex heart disease including:
  - Norwood procedure
  - Bidirectional Glenn shunt
  - Fontan procedure
  - Pulmonary atresia
- Pulmonary hypertension
- During some interventions such as:
  - Valvuloplasty
  - Pulmonary artery or vein stents
- Post heart transplant assessment
- On an individual who is having a device placed when:
  - A diagnostic catheterization or stenting is needed in addition to the device
  - The diagnostic catheterization is considered medically necessary separate from the device placement.
- Individuals with anomalous coronary arteries, or with syndromes associated with abnormal coronary arteries (i.e., Williams syndrome) or acquired CAD
  - When diagnostic images are not adequate or evaluation or treatment decision
  - Preoperative for cardiac surgery
  - New symptoms concerning for ischemia

Special Considerations

- These guidelines apply to individuals with stable conditions and who are not in the acute setting. Individuals in acute settings or with unstable angina should be handled as medical emergencies.
- When device placement is planned (ASD/VSD device, transcatheter valve implantation, PDA device), the procedure codes for those devices include all

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cardiac catheterization(s), intraprocedural contrast injection(s), fluoroscopic radiological supervision and interpretation, and imaging guidance performed to complete the procedure. A diagnostic catheterization may be considered on a case-by-case basis if there are unanswered issues via noninvasive imaging.

- A right heart catheterization is considered medically necessary for pulmonary artery interventions (e.g., stents, coils).

Coding

Cardiac Catheterization Procedure Codes

Codes	Cardiac Catheterization Procedures
93451-93464 93566-93568	**Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve**
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
bypass grafts	

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Codes	Cardiac Catheterization Procedures
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
RHC and bypass grafts	
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
LHC	
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
LHC and bypass grafts	
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
RHC and LHC	

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Codes	Cardiac Catheterization Procedures
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**
Codes 93593 to 93597 for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

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Multisystem Inflammatory Syndrome in Children (MIS-C)

Guideline

Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDCD-12)
References (PEDCD-12)

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Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDCD-12)

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MIS-C Indications for Cardiac Imaging (PEDCD-12.2)

Criteria

TTE is considered medically necessary to evaluate MIS-C at the time of presentation and for any of the following:

- there is a concern for new or recurrent MIS-C
- treatment planning or changes in medication (i.e., treatment with intravenous immunoglobulin [IVIg])
- new or changed cardiac symptoms or clinical findings

Serial TTE are considered medically necessary based on the ordering cardiologist's discretion when there is documented cardiac dysfunction.

CMR is considered medically necessary for MIS-C when TTE is inconclusive or suboptimal.

CCTA is considered medically necessary for MIS-C when coronary arteries are not completely visualized.

Cardiac catheterization or CCTA or MRA Chest is considered medically necessary in a symptomatic individual when imaging studies are positive, inconclusive, or otherwise lead to a conclusion that intervention is needed.

Imaging stress test (SPECT MPI, PET MPI, Echo stress, MRI stress) is considered medically necessary when there are new or progressing symptoms of ischemia or ventricular dysfunction.

MIS-C Repeat Cardiac Imaging (PEDCD-12.2.2)

TTE is considered medically necessary after discharge from the hospital for MIS-C with stable findings as follows:

- Within 1 week of discharge
- 4 weeks post-discharge
- 6 months post-discharge
- One year post-discharge

CMR is considered medically necessary for MIS-C as follows:

- when TTE is inconclusive or suboptimal; **or**

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- two to six months after diagnosis of an individual with evidence of cardiac involvement (e.g., symptoms, ECG abnormalities, abnormal cardiac biomarkers, or echocardiographic findings) as a one-time follow-up study

Individuals with dilated coronary arteries can have imaging based on the AHA Kawasaki guidelines as follows:

AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
All			All risk levels 4-6 weeks after acute illness		
1	Normal	Normal	One echo 2-12 months after acute illness	none	none
2	Dilation	Dilation	6 months One year If dilation remains echo every 2-5 years until resolves	none	none
		Normal	After acute illness: 2-12 months One echocardiogram at one year No echocardiogram after one year		
3.1	Small	Small	6 months 12 months then yearly	3 to 5 years	CCTA at 1 year then every 3-5 years

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AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
3.2	Small	Normal or dilated	12 months Then every 5 years	3-5 years	CCTA at 1 year then with inducible ischemia on stress imaging
4.1	Medium	Medium	3 months 6 months 12 months Every 6-12 months after that	2 to 5 years	CCTA at 1 year then every 2-5 years
4.2	Medium	Small	6 months and 12 months, every 1 year	3 to 5 years	CCTA at 1 year then every 3-5 years
4.3	Medium	Normal Or Dilated	6 months and 12 months then every 2 years	4 to 5 years	6 months and 12 months then if inducible ischemia on stress imaging

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AHA risk level	Largest Aneurysm At Any Point	Largest Current Aneurysm	Routine Echo	Routine Stress Imaging	Routine Coronary Imaging
5.1	Large	Large	1 month 3 months 6 months 9 months 12 months Then every 6 to 12 months	6-12 months	CCTA or cardiac catheteriza-tion at 2-6 months then every 1-5 years
5.2	Large	Medium	3 months 6 months 9 months 12 months Then every 6-12 months	2 to 5 years	CCTA at 1 year then every 2-5 years
5.3	Large	Small	3 months 6 months 9 months 12 months Every 12 months	2 to 5 years	CCTA at 1 year then every 2-5 years
5.4	Large	Normal Or Dilation	3 months 6 months 9 months 12 months Every 1-2 years	3-5 years	CCTA at 1 year then every 3-5 years

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Evidence Discussion

The peer-reviewed published literature indicates that cardiac involvement is common in children with Multisystem Inflammatory Syndrome in Children (MIS-C), with reported manifestations including ventricular dysfunction, myocarditis-like injury, coronary artery dilation or aneurysm formation, pericardial effusion, valvular regurgitation, arrhythmias, and cardiogenic shock. Early multicenter observational studies and systematic reviews evaluating hundreds to thousands of affected children demonstrated that echocardiographic abnormalities are frequently present during the acute phase and may evolve rapidly during hospitalization (Son et al., 2021; Sperotto et al., 2021). As a result, transthoracic echocardiography (TTE) has become the primary imaging modality for initial and serial cardiac assessment. Available evidence supports repeat echocardiography when treatment decisions may be affected, when ventricular function is abnormal, when coronary artery abnormalities are identified, or when clinical status changes. While many cardiac abnormalities improve over weeks to months, persistent ventricular dysfunction, coronary involvement, and myocardial injury have been reported in a subset of patients, supporting continued surveillance after discharge (Sperotto et al., 2021).

The existing evidence also supports the selective use of advanced cardiac imaging when echocardiographic findings are incomplete or when additional characterization may affect management. Cardiac magnetic resonance imaging (CMR) provides detailed assessment of ventricular function and may assist in evaluation of suspected myocarditis or persistent cardiac abnormalities. Published evidence describes MIS-C as a post-infectious inflammatory syndrome with frequent cardiovascular involvement, including myocarditis-like injury, ventricular dysfunction, coronary artery abnormalities, pericardial effusion, and conduction abnormalities (McMurray et al., 2020; Valverde et al., 2021). Coronary CT angiography (CCTA) is supported when echocardiographic visualization of the coronary arteries is incomplete, particularly because coronary dilation or aneurysm formation may occur in MIS-C and is often managed using Kawasaki disease coronary artery risk frameworks (McCrindle et al., 2017; Jone et al., 2024)

Professional society and consensus-based guidance supports serial cardiac surveillance following MIS-C, with imaging frequency guided by ventricular function, coronary artery findings, symptoms, recurrence, medication changes, and clinical recovery. The American College of Rheumatology clinical guidance for MIS-C provides consensus-based recommendations for evaluation and management of children with MIS-C and hyperinflammation associated with SARS-CoV-2, including multidisciplinary management and cardiac assessment when clinically indicated (Henderson et al., 2022).

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Codes

Guideline

Codes

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Codes

Codes associated with pediatric cardiology

CPT®	MRI/MRA
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
75565	Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure)

CPT®	CT
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3D image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3D image postprocessing, assessment of LV cardiac function, RV structure and function and evaluation of venous structures, if performed)

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CPT®	CTA
75580	Noninvasive estimate of coronary fractional flow reserve (FFR) derived from augmentative software analysis of the data set from a coronary computed tomography angiography, with interpretation and report by a physician or other qualified health care professional
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3D image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
75635	Computed tomographic angiography, abdominal aorta and bilateral iliofemoral lower extremity runoff, with contrast material(s), including noncontrast images, if performed, and image postprocessing

CPT®	Nuclear Medicine
78414	Determination of central c-v hemodynamics (non-imaging) (e.g., ejection fraction with probe technique) with or without pharmacologic intervention or exercise, single or multiple determinations
78428	Cardiac shunt detection
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan

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CPT®	Nuclear Medicine
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (e.g., myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (e.g., myocardial viability); with concurrently acquired computed tomography transmission scan
78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)
78451	Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
78453	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78454	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
78459	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion and/or ejection fraction, when performed), single study

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CPT®	Nuclear Medicine
78466	Myocardial imaging, infarct avid, planar; qualitative or quantitative
78468	Myocardial imaging, infarct avid, planar; with ejection fraction by first pass technique
78469	Myocardial imaging, infarct avid, planar; tomographic SPECT with or without quantification
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78473	Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification
78481	Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78491	Myocardial imaging, positron emission tomography (PET), perfusion (including ventricular wall motion and/or ejection fraction, when performed); single study at rest or stress (exercise or pharmacologic)
78492	Myocardial imaging, positron emission tomography (PET), perfusion (including ventricular wall motion and/or ejection fraction, when performed); multiple studies at rest and/or stress (exercise or pharmacologic)
78494	Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing

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CPT®	Nuclear Medicine
78496	Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure)
78597	Quantitative differential pulmonary perfusion, including imaging when performed
78598	Quantitative differential pulmonary perfusion and ventilation (e.g., aerosol or gas), including imaging when performed
78800	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (e.g., head, neck, chest, pelvis), single day imaging
78801	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (e.g., abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days
78802	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (e.g., head, neck, chest, pelvis), single day imaging
78804	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, requiring 2 or more days imaging

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CPT®	Nuclear Medicine
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (e.g., head, neck, chest, pelvis), single day imaging
0331T	Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment
0332T	Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT

CPT®	Ultrasound
93303	Transthoracic echocardiography for congenital cardiac anomalies; complete
93304	Transthoracic echocardiography for congenital cardiac anomalies; follow-up or limited study
93306	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral Doppler echocardiography, and with color flow Doppler echocardiography
93307	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, without spectral or color Doppler echocardiography
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
93312	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report

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CPT®	Ultrasound
93313	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); placement of transesophageal probe only
93314	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); image acquisition, interpretation and report only
93315	Transesophageal echocardiography for congenital cardiac anomalies; including probe placement, image acquisition, interpretation and report
93316	Transesophageal echocardiography (TEE) for congenital cardiac anomalies; placement of transesophageal probe only
93317	Transesophageal echocardiography for congenital cardiac anomalies; placement of transesophageal probe only
+93319	3D echocardiographic imaging and postprocessing during transesophageal echocardiography, or during transthoracic echocardiography for congenital cardiac anomalies, for the assessment of cardiac structure(s) (e.g., cardiac chambers and valves, left atrial appendage, interatrial septum, interventricular septum) and function, when performed (List separately in addition to code for echocardiographic imaging) Code with (93303-93304, 93312, 93314, 93315, 93317, 93350-93351)
+93320	Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); complete
+93321	Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); follow-up or limited study (List separately in addition to codes for echocardiographic imaging)
+93325	Doppler echocardiography color flow velocity mapping (List separately in addition to codes for echocardiography)

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CPT®	Ultrasound
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
+93352	Use of echocardiographic contrast agent during stress echocardiography (List separately in addition to code for primary procedure)
+93356	Myocardial strain imaging using speckle tracking-derived assessment of myocardial mechanics (List separately in addition to codes for echocardiography imaging)
C8921	Transthoracic echocardiography with contrast, or without contrast followed by with contrast, for congenital cardiac anomalies; complete
C8922	Transthoracic echocardiography with contrast, or without contrast followed by with contrast, for congenital cardiac anomalies; follow-up or limited study
C8923	Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D), includes M-mode recording, when performed, complete, without spectral or color doppler echocardiography
C8924	Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D), includes M-mode recording when performed, follow-up or limited study
C8925	Transesophageal echocardiography (TEE) with contrast, or without contrast followed by with contrast, real time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report

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CPT®	Ultrasound
C8926	Transesophageal echocardiography (TEE) with contrast, or without contrast followed by with contrast, for congenital cardiac anomalies; including probe placement, image acquisition, interpretation and report
C8928	Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report
C8929	Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral doppler echocardiography, and with color flow doppler echocardiography
C8930	Transthoracic echocardiography, with contrast, or without contrast followed by with contrast, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with physician supervision
+0439T	Myocardial contrast perfusion echocardiography, at rest or with stress, for assessment of myocardial ischemia or viability (List separately in addition to code for primary procedure)

Cardiac Catheterization Procedure Codes

Codes	Cardiac Catheterization Procedures
93451-93464 93566-93568	**Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve**
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed

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Codes	Cardiac Catheterization Procedures
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
with bypass grafts	
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
with RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
with RHC and bypass grafts	
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
with LHC	

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Codes	Cardiac Catheterization Procedures
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with LHC and bypass grafts	
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
with RHC and LHC	
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**
CPT® 93593 to 93597 are appropriate for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections

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Codes	Cardiac Catheterization Procedures
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

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Guideline

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General Guidelines (PEDCH-1.0)

CHP.GG.0001.0.A
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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms, including a detailed history, physical examination, and appropriate laboratory, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the chest is not supported. Advanced imaging of the chest is only supported in individuals who have documented active clinical signs or symptoms of disease involving the chest.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the chest are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Pediatric Chest Imaging Age Considerations (PEDCH-1.1)

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- Many conditions affecting the chest in the pediatric population have different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals under 19 years of age should be imaged according to the Pediatric Chest Imaging Guidelines if discussed. Any conditions not specifically discussed in the Pediatric Chest Imaging Guidelines should be imaged according to the General Chest Imaging Guidelines. Individuals 19 years or older should be imaged according to the General Chest Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Pediatric Chest Imaging Modality General Considerations (PEDCH-1.3)

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Criteria

- MRI
  - MRI Chest is generally performed without and with contrast (CPT® 71552) unless the individual has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize individual movement, anesthesia is considered medically necessary for almost all infants (except neonate) and young individuals (age <7 years), as well as older individuals with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this individual population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast is considered medically necessary if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
      - Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
  - If multiple body areas are supported by the guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently.
  - The presence of surgical hardware or implanted devices may preclude MRI.
  - The selection of best examination may require coordination between the provider and the imaging service.
- CT

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- CT Chest is generally performed either with contrast (CPT® 71260) or without contrast (CPT® 71250).
  - There are no generally accepted pediatric indications for CT Chest without and with contrast (CPT® 71270).
- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
- The selection of best examination may require coordination between the provider and the imaging service.

- Ultrasound
  - Ultrasound Chest (CPT® 76604) or Axilla (CPT® 76882) is considered medically necessary as an initial study for evaluating adenopathy, palpable chest wall lesions, pleural effusion or thickening, patency of thoracic vasculature, and diaphragm motion abnormalities.
  - For those individuals who do require advanced imaging, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the individual.
- Nuclear Medicine
  - Nuclear medicine studies other than PET/CT are rarely used in evaluation of the pediatric chest.
  - Pulmonary Ventilation-Perfusion Imaging (CPT® 78582) has been replaced by CTA Chest (CPT® 71275) or CT Chest with contrast (CPT® 71260), but is considered medically necessary for evaluation of suspected pulmonary embolism if CT is unavailable.
    - See **Pulmonary Embolism (PE) (CH-25.1)** in the Chest Imaging Guidelines.
  - Pulmonary Perfusion Imaging (CPT® 78580) is considered not medically necessary in lieu of CPT® 78582 for initial evaluation of suspected pulmonary embolism, but is medically necessary for follow-up of an equivocal or positive ventilation-perfusion lung scan (CPT® 78582) to evaluate for interval change.
  - Pulmonary Ventilation Imaging (CPT® 78579) is considered not medically necessary in lieu of CPT® 78582 for evaluation of suspected pulmonary embolism, but is considered medically necessary for additional evaluation of an abnormal perfusion-only scan (CPT® 78580).
  - Pulmonary split crystal function study (CPT® 78597 or CPT® 78598), also known as Quantitative Differential Pulmonary Perfusion, is considered medically necessary for preoperative planning of segmental, lobar, or lung resection.
  - Quantitative Differential Pulmonary Perfusion Lung Scan (CPT® 78597 or CPT® 78598), can be performed post-lung transplant to detect regional perfusion abnormalities.
  - Radiopharmaceutical nuclear medicine imaging of an inflammatory process (CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803) is rarely performed, but is

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considered medically necessary for evaluation of sarcoidosis or toxicity from drug toxicity (cyclophosphamide, busulfan, bleomycin, amiodarone, or nitrofurantoin).

- 3D Rendering
  - 3D Rendering indications in pediatric chest imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive. Clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

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Lymphadenopathy (PEDCH-2)

Guideline

Lymphadenopathy (PEDCH-2.1)
Reference (PEDCH-2)

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Lymphadenopathy (PEDCH-2.1)

CHP.LY.0002.1.A
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Criteria

- Axillary lymphadenopathy imaging indications in pediatric individuals are identical to those for adult individuals. See **Axillary Lymphadenopathy (and Mass) (CH-2.2)** in the Chest Imaging Guidelines.
- Supraclavicular adenopathy in pediatric individuals is almost always pathologic, and advanced imaging is considered medically necessary prior to excisional biopsy. Fine-needle aspiration, while common in adults prior to advanced imaging, is considered not medically necessary for evaluating lymphadenopathy in pediatric individuals. ANY combination of the following studies are considered medically necessary for evaluation of supraclavicular adenopathy:
  - CT Chest with contrast (CPT® 71260)
  - MRI Chest without and with contrast (CPT® 71552)
  - Ultrasound Chest (CPT® 76604)
- If malignancy is suspected, refer to the condition specific imaging guidelines as below:
  - Lymphoma: **Pediatric Lymphomas (PEDONC-5)** in the Pediatric Oncology Imaging Guidelines.
  - Soft tissue sarcoma: **Pediatric Soft Tissue Sarcomas (PEDONC-8)** in the Pediatric Oncology Imaging Guidelines.
  - Neuroblastoma: **Neuroblastoma (PEDONC-6)** in the Pediatric Oncology Imaging Guidelines.

Evidence Discussion

In pediatric patients, supraclavicular lymphadenopathy is considered highly suspicious for malignancy and warrants prompt imaging evaluation. Unlike in adults, fine-needle aspiration is not routinely considered medically necessary prior to imaging in children. Ultrasound (US) remains a first-line modality due to its safety profile, absence of ionizing radiation, and ability to provide real-time soft tissue characterization. US is particularly useful in differentiating cystic from solid lesions and guiding further imaging or biopsy decisions (Allen-Rhoades & Steuber, 2015).

For axillary lymphadenopathy, pediatric imaging guidelines mirror those of adults, with US being the preferred initial modality. US is non-invasive, widely available, and effective in identifying reactive versus suspicious lymph nodes. It also facilitates image-guided biopsy when needed. CT Chest is generally considered not medically necessary

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unless there is a high suspicion of systemic disease or malignancy (Allen-Rhoades & Steuber, 2015).

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Mediastinal Mass (PEDCH-3)

Guideline

Mediastinal Mass (PEDCH-3.1)
References (PEDCH-3)

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Mediastinal Mass (PEDCH-3.1)

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Criteria

- The causes of mediastinal masses in pediatric individuals are generally different than those in adults, and therefore, imaging considerations are different. Up to half of all pediatric mediastinal masses are malignant.
- Chest x-ray is considered medically necessary as an initial study for all individuals with suspected mediastinal mass.
- CT Chest with contrast (CPT® 71260) is considered medically necessary for any mediastinal mass identified on chest x-ray.
  - Masses can be very large and anterior masses frequently cause compression of the trachea and/or mediastinal blood vessels.
- MRI Chest without and with contrast (CPT® 71552) is considered medically necessary to evaluate any of the following findings:
  - a posterior (paravertebral) mediastinal mass on CT Chest that invades the spinal canal
  - CT findings that are inconclusive regarding specific anatomy
  - Large anterior mediastinal masses only when anesthesia is not used to complete the study.
- PET/CT (CPT® 78815) is considered medically necessary prior to biopsy in pediatric individuals if lymphoma is known or strongly suspected or there is evidence of tracheal compression on CT imaging. See **Pediatric Lymphoma (PEDONC-5)** in the Pediatric Oncology Imaging Guidelines.
- MIBG (CPT® 78800, CPT® 78802, CPT® 78803, or CPT® 78804) is considered medically necessary prior to biopsy in pediatric individuals if neuroblastoma is known or strongly suspected. See **Neuroblastoma (PEDONC-6)** in the Pediatric Oncology Imaging Guidelines.
- Ultrasound chest (CPT® 76604) is considered medically necessary in individuals younger than 5 years old to distinguish prominent but otherwise normal thymus from true mediastinal mass.
- A single repeat CT Chest with contrast (CPT® 71260) is considered medically necessary to confirm stability and avoid biopsy when NONE of the following features are present:
  - anterior mediastinal mass
  - enlarged lymph nodes anywhere in the imaging field
  - lymphopenia
  - pleural effusion

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Evidence Discussion

In pediatric populations, mediastinal masses require careful imaging evaluation due to the high likelihood of malignancy and the unique anatomical and physiological considerations in children. Chest radiography is considered the initial imaging modality of choice for suspected mediastinal masses, as it is widely available, low-cost, and effective in detecting large masses (Expert Panel on Thoracic Imaging et al., 2021).

When a mediastinal mass is identified on chest x-ray, cross-sectional imaging with CT Chest with contrast or MRI Chest with and without contrast is considered medically necessary. CT provides excellent anatomical detail and is particularly useful for assessing mass effect on adjacent structures, while MRI is preferred in cases where radiation exposure is a concern or when further soft tissue characterization is needed. MRI is especially valuable in evaluating posterior mediastinal masses or when CT findings are inconclusive (Expert Panel on Thoracic Imaging et al., 2021).

PET/CT is not considered routinely medically necessary for initial evaluation but may be considered in specific oncologic contexts such as suspected neuroblastoma (Expert Panel on Thoracic Imaging et al., 2021). Ultrasound is generally considered not medically necessary for mediastinal mass evaluation in older children but may be useful in children under five years of age to differentiate a prominent thymus from a true mass (Trinavarat & Riccabona, 2014).

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Hemoptysis (PEDCH-4)

Guideline

Hemoptysis – Imaging (PEDCH-4.1)
References (PEDCH-4)

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Hemoptysis – Imaging (PEDCH-4.1)

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Criteria

- True hemoptysis is rare in pediatric individuals. A detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging.
  - Aspirated blood from epistaxis or emesis frequently presents as hemoptysis, and history and physical examination will aid in this assessment.
- Chest x-ray is considered medically necessary as an initial study for stable individuals.
  - Advanced imaging is considered not medically necessary to evaluate individuals with epistaxis when there is a normal chest radiograph and no personal or family history of underlying lung disease or bleeding disorder.
  - CT Chest with contrast (CPT® 71260) or CTA Chest (CPT® 71275) is considered medically necessary for all other pediatric individuals with true hemoptysis.
    - CT Chest without contrast (CPT® 71250) is considered medically necessary for individuals with a documented allergy to CT contrast or significant renal dysfunction.
- MRI is considered not medically necessary in the evaluation of pediatric hemoptysis.

Evidence Discussion

Hemoptysis in pediatric populations is rare but can be life-threatening, necessitating a structured diagnostic approach. The most common causes include lower respiratory tract infections, bronchiectasis, foreign body aspiration, and congenital heart or vascular anomalies (Nevin, 2024; Garg et al., 2024). A detailed clinical history and physical examination are essential to detect true hemoptysis from other causes of bleeding, such as epistaxis or gastrointestinal sources (Nevin, 2024).

Chest radiography is the recommended initial imaging modality for stable pediatric patients presenting with hemoptysis. It is widely available, low-cost, and can identify parenchymal abnormalities or foreign bodies (Nevin, 2024; Garg et al., 2024). If the chest x-ray is normal and there is no history of lung disease or bleeding disorder, advanced imaging may not be considered medically necessary. However, in cases of true hemoptysis with abnormal radiographic findings or persistent symptoms, CT Chest with contrast or CTA Chest is considered medically necessary to localize the bleeding source and evaluate for vascular anomalies or infections (Gupta et al., 2018; Nevin, 2024). MRI is not routinely considered medically necessary in the evaluation of pediatric hemoptysis (Nevin, 2024).

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Cystic Fibrosis And Bronchiectasis (PEDCH-5)

Guideline

Cystic Fibrosis (PEDCH-5.1)
Bronchiectasis Not Associated with Cystic Fibrosis (PEDCH-5.2)
References (PEDCH-5)

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Cystic Fibrosis (PEDCH-5.1)

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Criteria

- Chest x-ray is considered medically necessary for initial evaluation of acute clinical symptoms in individuals with cystic fibrosis.
- CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is considered medically necessary in the setting of any of the following (chest x-ray not required):
  - hemoptysis
  - pneumonia worsening despite antibiotic therapy
  - pleural effusion or empyema
  - suspected fungal pneumonia
  - monitoring treatment changes on bronchiectasis
  - expiratory CT for evaluating small airways disease
  - pre- and post-lung transplant evaluation
  - uncooperative individual
- Low dose CT Chest without contrast (CPT® 71250) is considered medically necessary **every 2 years** for monitoring of bronchiectasis and small airways disease.
- Cystic fibrosis-associated liver disease develops in 5-10% of individuals with cystic fibrosis. Advanced imaging may be considered medically necessary if concerned for liver disease. See **Liver Disease (PEDAB-16)** in the Pediatric Abdomen Imaging Guidelines.

Evidence Discussion

Chest imaging plays a critical role in the diagnosis and longitudinal management of pediatric patients with cystic fibrosis (CF). Chest x-ray remains the initial imaging modality of choice for evaluating acute respiratory symptoms due to its accessibility, low cost, and ability to detect complications such as pneumonia, pleural effusion, or bronchiectasis (Egan et al., 2024).

CT Chest without contrast is considered medically necessary in specific clinical scenarios (Murphy et al., 2016; Ciet et al., 2023). CT imaging provides superior anatomical detail and is particularly valuable for assessing bronchiectasis and small airways disease. Low-dose CT protocols are recommended every two years for monitoring disease progression and treatment response (Szczesniak et al., 2017; O'Regan et al., 2024).

MRI is not routinely used for pulmonary imaging in CF but may be considered in research settings or when radiation exposure is a concern (Lasker, 2024).

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Bronchiectasis Not Associated with Cystic Fibrosis (PEDCH-5.2)

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- Bronchiectasis not associated with cystic fibrosis is rare in pediatric individuals, and imaging indications are identical to those for adult individuals. See **Bronchiectasis (CH-7.1)** in the Chest Imaging Guidelines.

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Bronchiolitis (PEDCH-6)

Guideline

Bronchiolitis (PEDCH-6.1)
References (PEDCH-6)

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Bronchiolitis (PEDCH-6.1)

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Criteria

Bronchiolitis is a self-limiting viral infection causing inflammation of the small airways, most common in infants under 12 months of age.

- Chest x-ray or chest ultrasound (CPT® 76604) is considered medically necessary when there is a clinical suspicion of pneumonia or other complications.
- Advanced imaging is considered not medically necessary for routine evaluation or monitoring of bronchiolitis.
- CT Chest with contrast (CPT® 71260) is considered medically necessary for the following:
  - pleural effusion or empyema on relevant chest x-ray or chest ultrasound (CPT® 76604)
  - immunocompromised individual with acute pulmonary symptoms
  - abnormality on relevant chest x-ray suggesting condition other than bronchiolitis

Evidence Discussion

Bronchiolitis is a common viral lower respiratory tract infection in infants, particularly under 12 months of age. It is typically self-limiting and managed supportively. Imaging is not routinely considered medically necessary for diagnosis or monitoring, as clinical evaluation is usually sufficient (House & Ralston, 2024).

Chest x-ray or chest ultrasound is considered medically necessary only when there is a clinical suspicion of complications such as pneumonia, pleural effusion, or when the presentation is atypical (Darras et al., 2015; Kirolos et al., 2020) . Lung ultrasound has shown promise as a radiation-free alternative to chest x-ray in evaluating bronchiolitis and its complications, with studies demonstrating good diagnostic accuracy (Jaworska et al., 2020; Smith et al., 2024) .

Advanced imaging such as CT Chest is not considered medically necessary in routine bronchiolitis management. However, it may be necessary in specific cases such as immunocompromised patients with acute pulmonary symptoms, or when chest x-ray reveals abnormalities suggesting conditions other than bronchiolitis (Kirolos et al., 2020).

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Pneumonia (PEDCH-7)

Guideline

Pneumonia (PEDCH-7.1)
Coronavirus Disease 2019 (COVID-19) (PEDCH-7.2)
References (PEDCH-7)

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Pneumonia (PEDCH-7.1)

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Criteria

- Pneumonia imaging indications in pediatric individuals are very similar to those for adult individuals. See **Pneumonia (CH-13.1)** in the Chest Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - Chest x-ray and/or Ultrasound chest (CPT® 76604) is considered medically necessary when the individual's condition does not respond to standard therapy.
  - CT Chest with contrast (CPT® 71260) is considered medically necessary for:
    - immunocompromised individuals with acute pulmonary symptoms
    - diagnosis of an abscess
    - necrotizing pneumonia cannot be confirmed
    - recurring pneumonia
    - acute complications
  - CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is considered medically necessary for individuals with recurrent lower respiratory tract infections.
  - Ultrasound chest (CPT® 76604) is considered medically necessary as an alternative for evaluation of complicated or recurrent childhood pneumonia.

Evidence Discussion

Pneumonia remains a leading cause of morbidity in pediatric populations, and imaging plays a critical role in the diagnosis, management, and evaluation of complications. Chest x-ray is the first line imaging modality for children who do not respond to standard therapy or present with atypical symptoms (Kelly & Sandora, 2024; American College of Radiology, 2019).

Ultrasound of the chest is increasingly recognized as a valuable alternative to chest radiography, particularly for evaluating complicated or recurrent pneumonia. It is radiation-free, portable, and has demonstrated high diagnostic accuracy in multiple studies (Stadler et al., 2017; Tsou et al., 2019; Jaworska et al., 2020) .

CT Chest is reserved for specific clinical scenarios, including immunocompromised children with acute pulmonary symptoms, suspected abscess or necrotizing pneumonia, recurrent lower respiratory tract infections, or acute complications (Andronikou et al., 2017; American College of Radiology, 2019). CT provides detailed anatomical information and is particularly useful when other imaging modalities are inconclusive.

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MRI is not routinely used for pneumonia imaging in children due to limited availability and longer acquisition times (Alexopoulou et al., 2024).

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Coronavirus Disease 2019 (COVID-19) (PEDCH-7.2)

CHP.PN.0007.2.A
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Criteria

- Pediatric imaging for COVID-19 positive individuals are similar to those for adult individuals. See **Coronavirus Disease 2019 (COVID-19) (CH-13.2)** in the Chest Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - chest x-ray is the initial imaging test for all pediatric individuals
  - for concerns involving **Multisystem Inflammatory Syndrome in Children (MIS-C)** see **(PEDCD-12)**

Evidence Discussion

In pediatric populations, chest imaging is not recommended as a screening tool for COVID-19 in asymptomatic individuals or those with mild symptoms unless they are at risk for disease progression (American College of Radiology, 2020; Rubin et al., 2020). Viral testing remains the gold standard for diagnosis, and imaging should not replace laboratory confirmation (American College of Radiology, 2020).

Chest x-ray is the initial imaging modality of choice in children with suspected or confirmed COVID-19 who present with moderate to severe symptoms or worsening respiratory status (Foust et al., 2020; Rubin et al., 2020). CT is not routinely considered medically necessary but may be considered in cases with clinical deterioration, suspected complications, or when alternative diagnoses are being considered (Foust et al., 2020; Wang et al., 2021).

Lung ultrasound has emerged as a useful adjunct in pediatric COVID-19 imaging, particularly in emergency and critical care settings. It offers a radiation-free alternative that can detect pulmonary involvement and guide management decisions (Nino et al., 2020; Yan et al., 2020).

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Solitary Pulmonary Nodule (PEDCH-8)

Guideline

Solitary Pulmonary Nodule (PEDCH-8.1)
References (PEDCH-8)

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Solitary Pulmonary Nodule (PEDCH-8.1)

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Criteria

The Fleischner Society guidelines for solitary pulmonary nodule management do not apply to pediatric individuals. An incidental solitary pulmonary nodule in a individual representing a primary lung carcinoma has never been reported in the literature. Similarly, an extrathoracic malignancy presenting with an incidental solitary pulmonary nodule in an otherwise healthy individual is very rare.

- CT Chest with contrast (CPT® 71260) is considered medically necessary as a one-time evaluation of a pulmonary nodule incidentally discovered on other imaging.
- Follow-up imaging of an incidental solitary pulmonary nodule in an asymptomatic healthy individual is considered **not** medically necessary.
  - Follow-up imaging is considered medically necessary for the following:
    - immunocompromised individuals
    - malignancy (see below)
    - invasive infection
    - new or worsening pulmonary symptoms
- Individuals with a malignant solid tumor who have pulmonary nodules of any size should have imaging according to the guideline section for the specific cancer type. See **Pediatric Oncology Imaging Guidelines** for specific imaging indications.
- This guideline section does not apply to multiple pulmonary nodules, which are imaged according to the underlying disorder in pediatric individuals.

Evidence Discussion

Incidental pulmonary nodules in pediatric populations are rare and differ significantly from adult cases in terms of etiology and clinical significance. Unlike adults, the likelihood of a solitary nodule representing a primary lung carcinoma in a child is exceedingly low (Assefa & Atlas, 2015; Westra, Brody, et al., 2015).

CT Chest with contrast is considered medically necessary for a one-time evaluation of an incidental pulmonary nodule discovered on other imaging modalities (Liang & Lee, 2022). Follow-up imaging is generally considered not medically necessary in asymptomatic, otherwise healthy children unless specific risk factors are present, such as immunocompromise, known malignancy, invasive infection, or new or worsening pulmonary symptoms (Liang & Lee, 2022; Martin et al., 2023).

Studies emphasize the importance of distinguishing benign from potentially concerning nodules based on imaging characteristics and clinical context (Barber et al., 2021;

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Dilimulati et al., 2024). The Society for Pediatric Radiology and other expert panels recommend individualized management strategies that avoid unnecessary radiation exposure while ensuring appropriate follow-up in high-risk cases (Dilimulati et al., 2024; Westra, Brody, et al., 2015).

Background and Supporting Information

A **nodule** is any pulmonary or pleural lesion that is a discrete, spherical opacity 2-30 mm in diameter surrounded by normal lung tissue. A larger nodule is called a mass. Entities that are not nodules, and are considered benign, include non-spherical linear, sheet-like, two-dimensional or scarring opacities (Westra, Brody, et al., 2015; Liang & Lee, 2022).

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Positive PPD Or Tuberculosis (PEDCH-9)

Guideline

Positive PPD Or Tuberculosis (PEDCH-9.1)
References (PEDCH-9)

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Positive PPD Or Tuberculosis (PEDCH-9.1)

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Criteria

- Positive PPD and tuberculosis imaging indications in pediatric individuals are similar to those for adult individuals.
  - See **PPD or TB (Mycobacterium tuberculosis and Nontuberculous Mycobacterial Pulmonary Disease [NTM-PD]) (CH-14.1)** in the Chest Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - MRI Spine with and without contrast of the symptomatic spine level is considered medically necessary in individuals with concern for spinal involvement of tuberculosis.
  - MRI Chest with and without contrast (CPT® 71552) can be considered as a radiation-free alternative to chest CT in pediatric individuals.

Evidence Discussion

In pediatric populations, imaging plays a critical role in the diagnosis and management of tuberculosis (TB) and nontuberculosis mycobacterial pulmonary disease (NTM-PD). Chest radiography remains the first-line imaging modality for children with suspected TB, particularly in those with a positive tuberculin skin test or interferon-gamma release assay (Cameron & Starke, 2024; Concepcion et al., 2023).

While chest x-ray is useful for detecting active TB, its sensitivity is limited, especially in early or latent disease. In cases where chest x-ray findings are equivocal or when complications are suspected, CT Chest provides superior anatomical detail and is recommended (Buonsenso et al., 2021; Tonne et al., 2022) . CT is particularly valuable in those with persistent or recurrent symptoms (Mahomed et al., 2023).

MRI is increasingly considered as a radiation-free alternative to CT in pediatric patients, especially for evaluating spinal involvement (Jain et al., 2020; Sodhi et al., 2023). MRI Chest with and without contrast may be used in select cases where radiation exposure is a concern.

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Asthma (PEDCH-10)

Guideline

Asthma (PEDCH-10.1)
References (PEDCH-10)

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Asthma (PEDCH-10.1)

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Criteria

- Chest x-ray and/or Ultrasound chest (CPT® 76604) is considered medically necessary to further evaluate respiratory distress when the individual's condition does not respond to standard therapy.
- Advanced imaging is not considered medically necessary for routine evaluation or monitoring of asthma.
- CT Chest without (CPT® 71250) or with (CPT® 71260) contrast is considered medically necessary for the following:
  - pleural effusion or empyema on relevant chest x-ray
  - immunocompromised individual with acute pulmonary symptoms
  - abnormality on relevant chest x-ray suggesting condition other than asthma, including suspected foreign body
  - asthma and poor response to bronchodilators or conventional inhaled corticosteroid therapy in whom associated conditions, such as allergic bronchopulmonary aspergillosis and eosinophilic pneumonia, can mimic asthma

Evidence Discussion

In pediatric asthma, imaging is not routinely considered medically necessary for diagnosis or monitoring, as clinical evaluation and response to therapy are typically sufficient. However, chest x-ray or ultrasound may be considered medically necessary when a child presents with respiratory distress that does not respond to standard therapy (Liu et al., 2024; American College of Radiology, 2019).

Chest radiography is useful in identifying complications or alternative diagnoses such as pneumonia, pneumothorax, or foreign body aspiration (Allie et al., 2018; Darras et al., 2015). Lung ultrasound has emerged as a promising tool for evaluating asthmatic pneumonia and other complications, offering a radiation-free alternative to chest x-ray (Ru et al., 2023; Goh & Kapur, 2016).

Advanced imaging such as CT Chest is not considered medically necessary for routine asthma evaluation but may be necessary in specific cases. These include poor response to bronchodilators or corticosteroids, suspected allergic bronchopulmonary aspergillosis, eosinophilic pneumonia, or when chest x-ray reveals abnormalities inconsistent with asthma (American College of Radiology, 2019; Matheson et al., 2025) .

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Health Equity Considerations

Asthma is the most common chronic disease among the pediatric population, caused by inflammation and muscle tightness around the airways. Symptoms include cough, wheeze, shortness of breath, and chest tightness. The disease can be mild or severe for intermittent periods of time. Asthma is treated by inhaled medications, delivering the medication directly to the lungs. The main types of inhalers are bronchodilators and steroids (World Health Organization, 2024).

Non-Hispanic Black children have a higher asthma prevalence than non-Hispanic White children as evidenced by increased emergency department visits, school absences, and long-term lung function impairment (Khanjahani et al., 2025). Factors related to this discrepancy include poor quality housing with issues including broken home infrastructure, as well as environmental exposure to cigarette smoke, mold, rodents, and insects (Hughes et al., 2017). Financial limitations are an additional determinant in accessing consistent healthcare and environmental modifications to manage asthma and to prevent emergency department visits and hospitalizations. Many of these factors related to the higher prevalence in non-Hispanic Black children are modifiable, such as the environment and lack of healthcare. To address inequities and modifiable factors, interventions are needed by key stakeholders on a community and individual level specific to impacted racial and ethnic groups (Binney et al., 2024).

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Pectus Deformities (PEDCH-11)

Guideline

Pectus Deformities (PEDCH-11.1)
References (PEDCH-11)

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Pectus Deformities (PEDCH-11.1)

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Criteria

- CT Chest without contrast (CPT® 71250), MRI Chest with and without contrast (CPT® 71552), or MRI Chest without contrast (CPT® 71550) is considered medically necessary in individuals with a pectus deformity for any of the following:
  - preoperative planning
  - significant cardiac depression after chest x-ray and echocardiography (CPT® 93306)
  - evidence of pulmonary impingement after chest x-ray and pulmonary function tests (PFTs) if there is increasing shortness of breath
    - Note: It may not be possible to obtain PFTs in individuals younger than 9 years old.
  - evaluation of congenital heart disease or Marfan's syndrome when suspected

Evidence Discussion

Pectus deformities, including pectus excavatum and pectus carinatum, are common congenital chest wall abnormalities in pediatric populations. Imaging plays a critical role in the diagnosis, preoperative planning, and assessment of cardiopulmonary impact (Buziashvili et al., 2019; Frantz, 2011).

In cases of significant cardiac depression or pulmonary impingement identified on chest x-ray and echocardiography or pulmonary function tests, advanced imaging with CT or MRI is considered medically necessary(Scalise & Demehri, 2023). CT Chest is frequently used for preoperative planning due to its ability to provide detailed anatomical information and calculate indices such as the Haller Index. However, due to concerns about radiation exposure, MRI is increasingly favored in pediatric patients. MRI offers high-resolution imaging without radiation exposure and is particularly useful for evaluating cardiac compression and thoracic abnormalities(Dore et al., 2017; Sun et al., 2019). MRI is also beneficial in assessing patients with congenital heart disease or syndromic conditions such as Marfan's syndrome (Koumbourlis, 2014; Marcovici et al., 2011).

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Breast Masses (PEDCH-12)

Guideline

Breast Masses (PEDCH-12.1)

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Breast Masses (PEDCH-12.1)

CHP.MS.0012.1.A
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See **Pediatric Breast Masses (PEDONC-17)** in the Pediatric Oncology Imaging Guidelines.

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Vascular Malformations (PEDCH-13)

Guideline

Vascular Ring (PEDCH-13.1)
Other Vascular Malformations (PEDCH-13.2)
References (PEDCH-13)

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Vascular Ring (PEDCH-13.1)

CHP.VM.0013.1.A
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Criteria

- Chest x-ray is the recommended initial study in individuals with respiratory symptoms. A chest x-ray is considered not medically necessary for individuals diagnosed with a vascular ring on prenatal imaging studies.
- Barium esophagram is the recommended initial study in individuals with feeding difficulties.
- CT Chest with contrast (CPT® 71260), CTA Chest (CPT® 71275), MRA Chest (CPT® 71555), or MRI Chest without contrast (CPT® 71550) in individuals with known or suspected vascular ring is considered medically necessary after prenatal imaging studies, chest x-ray, or barium esophagram.
- Echocardiogram is considered medically necessary to rule out associated congenital heart disease.
  - CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325 are considered medically necessary for initial evaluation of individuals with vascular ring and no prior echocardiograms.

Evidence Discussion

Vascular rings are congenital anomalies of the aortic arch system that can encircle and compress the trachea and esophagus, leading to respiratory and feeding difficulties in pediatric patients. Early and accurate imaging is essential for diagnosis and surgical planning (Licari et al., 2015; Poletto et al., 2017).

Chest x-ray is typically the initial imaging modality in children presenting with respiratory symptoms, although it may be normal or nonspecific. Barium esophagram is recommended in children with feeding difficulties, as it can demonstrate esophageal compression suggestive of a vascular ring (Hanneman et al., 2017; Backer et al., 2016).

Advanced imaging with CT Chest, CTA, MRA, or MRI Chest is considered medically necessary in children with known or suspected vascular rings following initial imaging. These modalities provide detailed anatomical information about the vascular structures and their relationship to the airway and esophagus. MRI is particularly advantageous in pediatric populations due to the absence of radiation (Sommburg et al., 2018; Madueme, 2022). Echocardiography is also essential to evaluate for associated congenital heart disease, which may coexist with vascular rings (Pasternack et al., 2024) .

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Background and Supporting Information

Vascular rings generally present with either respiratory symptoms (stridor, wheezing, tachypnea, cough) or feeding difficulties (dysphagia, slow feeding, hyperextension of the head while feeding, weight loss, failure to thrive), but can also be discovered incidentally on imaging obtained for other purposes (Licari et al., 2015; Backer et al., 2016; Worhunsky et al., 2021).

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Other Vascular Malformations (PEDCH-13.2)

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See **Pulmonary Arteriovenous Malformations (PEDCH-14.2)** for Pulmonary AVMs.

See **Vascular Anomalies (PEDPVD-2)** in the Pediatric Peripheral Vascular Disease Imaging Guidelines.

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Congenital Chest Diseases (PEDCH-14)

Guideline

Congenital Cystic Lung Diseases (PEDCH-14.1)
Pulmonary Arteriovenous Malformations (PEDCH-14.2)
Congenital Diaphragmatic Hernia (PEDCH-14.3)
Pulmonary Sequestration (PEDCH-14.4)
References (PEDCH-14)

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Pulmonary Sequestration (PEDCH-14.4)

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Criteria

- Pulmonary sequestration imaging indications in pediatric individuals are similar to those for adult individuals.
  - See **Pleural-Based Nodules and Other Abnormalities (CH-17.1)** in the Chest Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - CTA Chest (CPT® 71275) is the gold standard for diagnosing pulmonary lung abnormalities.
  - CT Chest with contrast (CPT® 71260) and MRI Chest without contrast (CPT® 71550) are alternative imaging modalities that can be used for diagnosis.

Evidence Discussion

Pulmonary sequestration is a rare congenital lung malformation characterized by nonfunctional lung tissue that lacks normal communication with the tracheobronchial tree and receives systemic arterial blood supply. In pediatric populations, early and accurate diagnosis is critical to avoid complications such as recurrent infections, respiratory distress, and misdiagnosis with other thoracic anomalies. CTA remains the gold standard for diagnosis, offering high-resolution visualization of abnormal vascular supply and lesion morphology, which is essential for surgical planning and clinical management (Newman, 2022; Tivnan et al., 2022).

Studies have demonstrated that CT and CTA provide reliable identification of both intralobar and extralobar sequestration in children, with high sensitivity for detecting systemic arterial supply and venous drainage (Han et al., 2025). MRI may serve as a complementary modality, especially in cases where radiation exposure is a concern, although its diagnostic accuracy for vascular anomalies is generally lower than CTA (Masselli et al., 2025).

Imaging plays a critical role in differentiating pulmonary sequestration from other congenital lung malformations such as congenital pulmonary airway malformation and bronchogenic cysts (Fichera et al., 2024; Cancemi et al., 2024).

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Congenital Cystic Lung Diseases (PEDCH-14.1)

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Criteria

- This section includes common congenital cystic lung lesions such as:
  - bronchogenic cyst
  - congenital pulmonary airway malformation (congenital cystic adenomatoid malformation)
  - congenital lobar overinflation
- CT Chest with contrast (CPT® 71260) is considered medically necessary when a cystic lung lesion is suspected.
- MRI Chest with and without contrast (CPT® 71552) is considered medically necessary if CT is inconclusive or if requested for pre-operative planning.

Evidence Discussion

Congenital cystic lung diseases encompass a spectrum of developmental anomalies including bronchogenic cysts, congenital pulmonary airway malformations, and congenital lobar overinflation. Early and accurate imaging is essential for diagnosis, surgical planning, and monitoring (Chowdhury & Chakraborty, 2015; Blatter & Finder, 2024).

CT Chest is the primary imaging modality for evaluating suspected cystic lung lesions due to its high spatial resolution and ability to delineate lesion morphology and vascular anatomy (Hermelijn et al., 2021; Tivnan et al., 2022). MRI of the chest is considered medically necessary when CT findings are inconclusive or when detailed preoperative planning is required, particularly to avoid radiation in younger patients (Newman, 2022; Fichera et al., 2024). MRI is especially useful in evaluating complex lesions and their relationship to adjacent structures, and it provides superior soft tissue contrast without radiation exposure (Cancemi et al., 2024; Pederiva et al., 2023).

Background and Supporting Information

- Cystic lung disease may be first identified on prenatal ultrasound, or discovered incidentally on chest x-ray (Chowdhury & Chakraborty, 2015; Blatter & Finder, 2024; Liszewski & Lee, 2018).

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Pulmonary Arteriovenous Malformations (PEDCH-14.2)

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Criteria

- Pulmonary arteriovenous malformations (PAVMs) are vascular structures that most commonly result from abnormal communication between pulmonary arteries and pulmonary veins.
  - Chest x-ray is considered medically necessary as an initial imaging modality for individuals with known AVMs, or individuals presenting with hypoxemia and/or hemoptysis.
  - CTA or MRA is considered medically necessary in individuals with known AVM or abnormal chest x-ray suggesting AVM for treatment planning.

Evidence Discussion

Pulmonary arteriovenous malformations (PAVMs) are rare vascular anomalies that can lead to significant clinical symptoms such as hypoxemia and hemoptysis in pediatric populations. Early and accurate imaging is essential for diagnosis and treatment planning (Chowdhury & Chakraborty, 2015; Blatter & Finder, 2024).

Chest x-ray is the recommended initial imaging modality for children presenting with symptoms or known AVMs. While it may not detect small or atypical lesions, it provides a useful screening tool (Hanley et al., 2016).

CTA and MRA are considered medically necessary for further evaluation when chest x-ray findings are abnormal or when a known AVM requires treatment planning. These modalities offer detailed visualization of vascular anatomy. CTA is considered the gold standard for defining vascular structures, while MRA is preferred in younger patients to avoid radiation (Hosman et al., 2017; Newman, 2022).

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Congenital Diaphragmatic Hernia (PEDCH-14.3)

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Criteria

- Congenital diaphragmatic hernia (CDH) is a defect in the diaphragm which may allow the abdominal organs to enter the chest cavity, and may lead to compromised pulmonary function or may be associated with congenital heart disease.
  - Over 90% of the hernias occur in the posterolateral diaphragm (Bochdalek hernia) typically on the left side.
  - Most of the rest of the hernias are in the anteromedial diaphragm (Morgagni hernia).
- The vast majority of CDH are diagnosed prenatally (see **Fetal MRI [PV-15.1]**) in the Pelvis Imaging Guidelines), or as an inpatient shortly after delivery.
- If there is clinical concern for CDH, chest x-ray and/or US Chest (CPT® 76604) is considered medically necessary as the initial imaging study.
- CT Chest with contrast (CPT® 71260) or MRI Chest with and without contrast (CPT® 71552) is considered medically necessary when chest x-ray and/or US are inconclusive, or if requested for treatment planning.

Evidence Discussion

Congenital diaphragmatic hernia (CDH) is a developmental defect of the diaphragm that allows abdominal organs to herniate into the thoracic cavity, potentially impairing lung development and function. Most cases are diagnosed prenatally or shortly after birth, but imaging remains essential for diagnosis and treatment planning (Chowdhury & Chakraborty, 2015; Ahlfeld, 2024).

Chest x-ray and ultrasound are the recommended initial imaging modalities when CDH is suspected postnatally. These modalities are effective in identifying herniated abdominal contents within the thoracic cavity and assessing lung volume (Karmazyn et al., 2019; Corsini et al., 2019).

When initial imaging is inconclusive or further anatomical detail is required for surgical planning, CT chest or MRI chest is considered medically necessary. CT provides excellent spatial resolution, while MRI offers a radiation-free alternative, particularly beneficial in neonates and infants (Brown et al., 2022; Newman, 2022).

Advanced imaging also aids in identifying associated anomalies such as congenital heart disease or pulmonary hypoplasia. Structured imaging protocols and

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multidisciplinary collaboration are essential for optimal diagnosis and management of CDH (Hermelijn et al., 2021; Tivnan et al., 2022) .

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Procedure Codes Associated With Chest Imaging

Guideline

Procedure Codes Associated With Chest Imaging

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Procedure Codes Associated With Chest Imaging

MRI	CPT®
MRI Chest without contrast	71550
MRI Chest with contrast (rarely used)	71551
MRI Chest without and with contrast	71552
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Chest (non-cardiac)	71555

CT	CPT®
CT Chest without contrast	71250
CT Chest with contrast	71260
CT Chest without and with contrast (rarely used)	71270
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT®
CTA Chest (non-coronary)	71275

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Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Pulmonary Ventilation (e.g., Aerosol or Gas) Imaging	78579
Pulmonary Perfusion Imaging	78580
Pulmonary Ventilation (e.g., Aerosol or Gas) and Perfusion Imaging	78582
Quantitative Differential Pulmonary Perfusion, Including Imaging When Performed	78597
Quantitative Differential Pulmonary Perfusion and Ventilation (e.g., Aerosol or Gas), Including Imaging When Performed	78598

Ultrasound	CPT®
Ultrasound, chest (includes mediastinum, chest wall, and upper back)	76604
Ultrasound, axilla	76882
Ultrasound, breast; *unilateral*, including axilla when performed; complete	76641
Ultrasound, breast; *unilateral*, including axilla when performed; limited	76642

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General Guidelines (PEDHD-1)

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Procedure Codes Associated with Head Imaging

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Procedure Codes Associated with Head Imaging	
MRI	**CPT®**
MRI Brain without contrast	70551
MRI Brain with contrast (rarely used)	70552
MRI Brain without and with contrast	70553
MRI Orbit, Face, Neck without contrast	70540
MRI Orbit, Face, Neck with contrast (rarely used)	70542
MRI Orbit, Face, Neck without and with contrast	70543
MRI Temporomandibular Joint (TMJ)	70336
Functional MRI Brain not requiring physician or psychologist	70554
Functional MRI Brain requiring physician or psychologist	70555
MR Spectroscopy	76390
Unlisted MRI procedure (for radiation planning or surgical software)	76498
MRA	**CPT®**
MRA Head without contrast	70544
MRA Head with contrast	70545
MRA Head without and with contrast	70546

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Procedure Codes Associated with Head Imaging	
MRA Neck without contrast	70547
MRA Neck with contrast	70548
MRA Neck without and with contrast	70549
CT	**CPT®**
CT Head without contrast	70450
CT Head with contrast	70460
CT Head without and with contrast	70470
CT Orbits without contrast (includes temporal bone and mastoid)	70480
CT Orbits with contrast (includes temporal bone and mastoid)	70481
CT Orbits without and with contrast (includes temporal bone and mastoid)	70482
CT Maxillofacial without contrast (includes sinuses, jaw, and mandible)	70486
CT Maxillofacial with contrast (includes sinuses, jaw, and mandible)	70487
CT Maxillofacial without and with contrast (includes sinuses, jaw, and mandible)	70488
CT Neck without contrast (includes jaw, and mandible)	70490
CT Neck with contrast (includes jaw, and mandible)	70491
CT Neck without and with contrast (includes jaw, and mandible)	70492
CT Guidance for Stereotactic Localization (used for sinus surgery planning)	77011
CT Guidance for Placement of Radiation Therapy Fields	77014

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Procedure Codes Associated with Head Imaging	
Unlisted CT procedure (for radiation planning or surgical software)	76497
CTA	**CPT®**
CTA Head	70496
CTA Neck	70498
CTA Head and Neck without and with contrast	70471

Nuclear Medicine	**CPT®**
PET Brain Metabolic Evaluation	78608
PET Brain Perfusion Evaluation	78609
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; whole body	78816
Brain Scintigraphy Static Limited	78600
Brain Scintigraphy Limited with Vascular Flow	78601
Brain Scintigraphy Complete Static	78605
Brain Scintigraphy Complete with Vascular Flow	78606
Brain Imaging Vascular Flow	78610
Cisternogram	78630
Cerebrospinal Ventriculography	78635
Shunt Evaluation	78645
CSF Leakage Detection	78650

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Radiopharmaceutical Dacryocystography	78660
Ultrasound	**CPT®**
Echoencephalography (Head or Cranial Ultrasound)	76506
Ophthalmic ultrasound, diagnostic; B-scan & quantitative A-scan performed same encounter	76510
Ophthalmic ultrasound, diagnostic; quantitative A-scan only	76511
Ophthalmic ultrasound, diagnostic; B-scan	76512
Ophthalmic ultrasound, diagnostic; anterior segment ultrasound, immersion (water bath) B-scan	76513
Ophthalmic ultrasound, diagnostic; corneal pachymetry, unilateral or bilateral	76514
Ophthalmic biometry by ultrasound, A-scan	76516
Ophthalmic biometry by ultrasound, A-scan, with lens power calculation	76519
Ophthalmic ultrasonic foreign body localization	76529
Soft tissues of head and neck Ultrasound (thyroid, parathyroid, parotid, etc.)	76536
Transcranial Doppler study of the intracranial arteries; complete study	93886
Transcranial Doppler study of the intracranial arteries; limited study	93888

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General Guidelines (PEDHD-1.0)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination with a thorough neurologic examination since the onset or change in signs and/or symptoms, appropriate laboratory studies and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the individual is undergoing a guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail, or messaging) since the onset or change in signs and/or symptoms can serve as a pertinent clinical evaluation.
  - A detailed neurological exam is required prior to advanced imaging except in the following scenarios:
    - Individual is undergoing a guideline-supported scheduled follow-up imaging evaluation
    - Tinnitus, TMJ, sinus or mastoid disease, ear pain, hearing loss, eye disease, papilledema, dental requests and epistaxis (a relevant physical exam is still required)
    - The request is from a neurologist, neurosurgeon, endocrinologist, otolaryngologist, or ophthalmologist who has evaluated the individual since onset of symptoms.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the head is considered not medically necessary. Advanced imaging of the head is only considered medically necessary in individuals who have documented active clinical signs or symptoms of disease involving the head.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the head are considered not medically necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following:

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safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Pediatric Head Imaging Age Considerations (PEDHD-1.1)

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- Many conditions affecting the head in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals who are under 19 years of age and have any conditions not specifically discussed in the General Head Imaging Guidelines should be imaged according to the Pediatric Head Imaging Guidelines. Any conditions not specifically discussed in the Pediatric Head Imaging Guidelines should be imaged according to the General Head Imaging Guidelines. Individuals who are 19 years of age or older should be imaged according to the General Head Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Pediatric Head Imaging Appropriate Clinical Evaluation (PEDHD-1.2)

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Requests for Studies with Overlapping Fields

- There are many CPT® codes for imaging the head that have significantly overlapping fields. In the majority of cases where multiple head CPT® codes are requested, only one CPT® code is appropriate unless there is clear documentation of a need for the additional codes to cover all necessary body areas.
- See **General Guidelines - Anatomic Issues (HD-1.1)** in the Head Imaging Guidelines for the correct coding of these studies.

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Pediatric Head Imaging Modality General Considerations (PEDHD-1.3)

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Criteria

- MRI
  - MRI is superior to CT imaging of the pediatric head unless otherwise stated in a specific guideline section.
  - Due to duration of MRI acquisition and the need to minimize individual movement, anesthesia is typically required for most infants (excluding neonates), young children (age under 7 years), and older children with developmental or maturity limitations.
  - MRI protocols in this population should aim to minimize anesthesia exposure. When intravenous access is already established for anesthesia and there are no contraindications to contrast, performing MRI both without and with contrast may be appropriate to avoid repeat imaging and additional anesthesia if the non-contrast study is inconclusive. The use of gadolinium-based contrast agents should be carefully considered given evidence of deposition in the brain and other tissues.
  - MRI/MRA of all necessary body areas, when multiple body areas are supported by the guidelines for the clinical condition being evaluated, should be obtained concurrently in the same anesthesia session.
  - For MRI spine imaging with contrast to be performed following a contrast-enhanced MRI Brain, see **CNS Tumors General Considerations (PEDONC-4.1)** in the Pediatric and Special Populations Oncology Guidelines.
- CT
  - CT is generally inferior to MRI for imaging of the pediatric head but has specific indications in which it is the preferred modality listed in specific sections of these guidelines.
    - CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
  - CT Head without contrast (CPT® 70450) is considered medically necessary for:
    - Mass effect
    - Blood/blood products
    - Urgent/emergent settings due to availability and speed of CT
    - Trauma
    - Recent hemorrhage, whether traumatic or spontaneous
    - Bony structures of the head evaluations including dystrophic calcifications

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- Hydrocephalus evaluation and follow-up
  - Some centers use limited non-contrast “fast or rapid MRI” (CPT® 70551) to minimize radiation exposure in children - these requests are appropriate.
- Prior to lumbar puncture in individuals with cranial complaints
- Scenarios in which MRI is contraindicated (e.g., pacemakers, ICDs, cochlear implants, aneurysm clips, orbital metallic fragments, etc.)
- Concern for calcifications

- CT and MR Angiography (CTA and MRA) Head and Neck
  - Contrast level
    - MRA Head may be performed without contrast (CPT® 70544), with contrast (CPT® 70545), or without and with contrast (CPT® 70546).
    - CTA Head may be performed/done without and with contrast (CPT® 70496).
    - MRA Neck may be done either without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549), depending on facility preference and protocols and type of scanner.
    - CTA Neck is done without and with contrast (CPT® 70498).
    - CTA Head and Neck without and with contrast (CPT® 70471). This code must be substituted when both CTA Head and Neck may be performed together during the same session.
  - Indications for CTA and MRA Head and Neck vessels include, but are not limited to the following:
    - Pulsatile tinnitus
    - Hemifacial spasm, if consideration for surgical decompression
    - Evaluation of stroke or TIA (See **Pediatric Stroke Initial Imaging (PEDHD-12.2)**, **Pediatric Stroke Subsequent Imaging (PEDHD-12.3)**, **Moyamoya Disease (PEDHD-12.4)**, **Sickle Cell Disease (PEDHD-12.5),** and **CNS Vasculitis (PEDHD-12.6)** including collateral assessment)
    - Follow-up of known cerebral artery stenosis
    - Trigeminal neuralgia that has failed medical therapy
    - Cerebral sinus thrombosis suspected with increased intracranial pressure (refractory headaches, papilledema, diagnosis of pseudotumor cerebri)
    - Aneurysm suspected with acute "thunderclap" headache syndrome and appropriate screening or evaluation of known subarachnoid hemorrhage and pseudoaneurysms (may be appropriate to limit CTA to include only the head to avoid unnecessary radiation to the individual) (See **Pediatric Intracranial Aneurysms (PEDHD-10.1)**)
    - Noninflammatory vasculopathy, including radiation vasculopathy (See **Long Term Pediatric Cancer Survivors (PEDONC-19)** in the Pediatric and Special Populations Oncology Imaging Guidelines)
    - Traumatic vascular injuries

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- Vascular malformations, vascular anatomic variants, and fistulas (See **Pediatric Intracranial Arteriovenous Malformations (AVM) (PEDHD-10.2)**)
- Arterial, including carotid dissections
- Tumors of vascular origin or involving vascular structures
- Surgical and radiation therapy localization, planning, and neuronavigation
- Evaluation for vascular intervention and follow-up including post-surgical/post-treatment vascular complications
- Intra-cranial pre-operative planning if there is concern of possible vascular involvement or risk for vascular complication from procedure
- Vasculitis and collagen vascular disease (See **CNS Vasculitis (PEDHD-12.6)**)
- Sickle Cell disease (See **Sickle Cell Disease (PEDHD-12.5)**)
- Moyamoya disease (See **Moyamoya Disease (PEDHD-12.4)**)
- Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebral-basilar system

◦ For follow-up of aneurysm clipping or coiling procedures, see **Intracranial Aneurysms (HD-12.1)** in the Head Imaging Guidelines.

- CT and MR Venography (CTV and MRV)
  - ◦ CTV and MRV are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography).
  - ◦ If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures.
  - ◦ MRA without and with contrast with venous sinus thrombosis to differentiate total from subtotal occlusion
- Ultrasound
  - ◦ Cranial ultrasound (CPT® 76506) is a non-invasive means of evaluating for intracranial abnormalities in infants with an open anterior fontanelle.
  - ◦ Transcranial Doppler ultrasonography has some utility in select populations of older children with known or suspected intracranial vascular disease.
- Nuclear Medicine
  - ◦ Nuclear medicine studies other than metabolic PET imaging on the pediatric brain or head are rarely performed in an elective outpatient setting, but the following studies are considered medically necessary for the following indications:
    - Brain Scintigraphy with or without vascular flow (any one of CPT® codes: CPT® 78600, CPT® 78601, CPT® 78605, or CPT® 78606)
      - Establish brain death
    - Radiopharmaceutical Localization Imaging SPECT (CPT® 78803)
      - Immunocompromised individuals with mass lesion detected on CT or MRI for differentiation between lymphoma and infection

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        - Radiopharmaceutical Localization Imaging SPECT (CPT® 78803) with vasodilating agent acetazolamide (Diamox) challenge when surgery or other vascular intervention is being considered (i.e., Moyamoya)
    - Brain Imaging Vascular Flow (CPT® 78610)
        - Cerebral ischemia
        - Establish brain death (rarely done in outpatient setting)
    - CSF Leakage Detection (CPT® 78650)
        - Evaluation of CSF rhinorrhea or otorrhea, or refractory post-lumbar puncture headache
    - Radiopharmaceutical Dacryocystography (CPT® 78660)
        - Suspected obstruction of nasolacrimal duct due to excessive tearing
- 3D Rendering
    - CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) is considered medically necessary in the following clinical scenarios:
        - Bony conditions:
            - Evaluation of congenital skull abnormalities in newborns, infants, and toddlers (usually for pre-operative planning)
            - Complex joint fractures or pelvis fractures
            - Spine fractures (usually for pre-operative planning)
            - Complex facial fractures
        - Pre-operative planning for other complex surgical cases
        - Cerebral angiography
    - 3D Rendering (CPT® 76377 or CPT® 76376) is considered medically necessary for surgical planning and surgical follow-up after craniotomy when ordered by a surgical specialist.
    - 3D Rendering indications in pediatric head imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.
- CT or MRI Perfusion (See **CT or MRI Perfusion (HD-24.5)** in the Head Imaging Guidelines.)

Background and Supporting Information

- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive. Clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.
- “The U.S. Food and Drug Administration (FDA) is warning that repeated or lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years or in pregnant women during their third trimester may

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affect the development of children's brains. … Published studies in pregnant animals and young animals have shown the use of general anesthetic and sedation drugs for more than 3 hours caused widespread loss of nerve cells in the brain. …All the studies in children had limitations, and it is unclear whether any negative effects seen in children's learning or behavior were due to the drugs or to other factors, such as the underlying medical condition that led to the need for the surgery or procedure" (Joint Commission, 2022).

- Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
  - The FDA has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed (Starekova, Pirasteh & Reeder, 2024).

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General Guidelines-Other Imaging Situations (PEDHD-1.4)

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Criteria

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) can be performed for nausea and vomiting which is persistent and unexplained and there is a negative GI evaluation.
- Screening for metallic fragments before MRI should be done initially with plain x-ray.
- Plain x-ray is generally sufficient to screen for aneurysm clips.
- For neurosarcoidosis, see **Autoimmune/Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD-14.3)**.

Background and Supporting Information

- The use of CT Orbital to rule out orbital metallic fragments prior to MRI is rarely necessary.
- Plain x-rays are generally sufficient; x-ray detects fragments of 0.12 mm or more, and CT detects those of 0.07 mm or more.

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Specialized Imaging Techniques (PEDHD-2)

Guideline

Magnetic Resonance Spectroscopy (MRS, CPT® 76390) (PEDHD-2.1)
Functional Magnetic Resonance Imaging (fMRI, CPT® 70554 and CPT® 70555) (PEDHD-2.2)
PET Brain Imaging (CPT® 78608) (PEDHD-2.3)
References (PEDHD-2)

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Magnetic Resonance Spectroscopy (MRS, CPT® 76390) (PEDHD-2.1)

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Criteria

- Magnetic Resonance Spectroscopy (MRS) involves the analysis of the levels of certain chemicals in pre-selected voxels (small regions) on an MRI scan done at the same time.
- Uses in pediatric neuro-oncology: See **Pediatric CNS Tumors (PEDONC-4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- MRS is considered medically necessary in individuals with neonatal hypoxic ischemic encephalopathy to help estimate the age of the injury.
- Uses in Metabolic Disorders:
  - See **Neurometabolic and Neurogenetic Disorders (PEDHD-19.4)**.
- MRS is considered not medically necessary for all other pediatric indications at this time.

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Functional Magnetic Resonance Imaging (fMRI, CPT® 70554 and CPT® 70555) (PEDHD-2.2)

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Criteria

- fMRI is considered medically necessary to define eloquent areas of the brain as part of pre-operative planning for epilepsy surgery or removal of a mass lesion.
  - The documentation should be clear that brain surgery is planned.
  - Can be performed concurrently with MRI Brain (CPT® 70551 or CPT® 70553) and/or PET Brain Metabolic (CPT® 78608 or CPT® 78609).
- fMRI is considered not medically necessary for all other pediatric indications at this time.

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PET Brain Imaging (CPT® 78608) (PEDHD-2.3)

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Criteria

- Metabolic FDG PET (CPT® 78608)
  - For pre-operative planning for epilepsy surgery, see **Special Imaging Studies in Evaluation for Epilepsy Surgery (PEDHD-6.3)**.
  - For encephalitis including autoimmune encephalitis, see **Autoimmune/ Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD 14.3)**.
  - For uses in pediatric neuro-oncology, see **Pediatric CNS Tumors (PEDONC-4)**.
  - Metabolic FDG PET (CPT® 78608) is considered not medically necessary for all other pediatric indications at this time.
- For Metabolic PET/MRI, see **Special Imaging Studies in Evaluation for Epilepsy Surgery (PEDHD-6.3)**.

Background and Supporting Information

- FDG PET Brain is considered medically necessary to define active areas of the brain as part of pre-operative planning for epilepsy surgery.
- FDG PET Brain/MRI is generally considered not medically necessary for neurological conditions, except pre-operative planning for epilepsy surgery, due to lack of standardization in imaging technique and interpretation.

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Pediatric Headache (PEDHD-3)

Guideline

Pediatric Headache (PEDHD-3.1)
References (PEDHD-3)

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Pediatric Headache (PEDHD-3.1)

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Criteria

- A pertinent clinical evaluation including a detailed history and physical examination with a thorough neurologic examination, since the onset or change in signs and/or symptoms, and appropriate laboratory studies should be performed prior to considering advanced imaging.
- Advanced imaging is considered not medically necessary for pediatric individuals with headache in the absence of supported indications.

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Indications	Medically Necessary Imaging Study
◦ Age less than or equal to 5 years ◦ Focal neurological complaints including acute hypertension or altered mental status ◦ Clumsiness (common description of gait or coordination problems in young children) ◦ Headaches awakening from sleep or always present in the morning ◦ Headaches associated with morning nausea/vomiting ◦ Seizures ◦ Progressive worsening in headache frequency and severity without period of temporary improvement ◦ Systemic symptoms such as persistent fever, weight loss, rash, or joint pain ◦ Immunocompromised individual ◦ Known history of cancer of any type ◦ Known autoimmune or rheumatologic disease ◦ Known genetic disorder with predisposition to intracranial mass lesions ◦ History of stable chronic headaches with recent significant change in frequency or severity ◦ Neurological signs and/or symptoms, including headache, after COVID-19 infection ◦ If a recent CT Head is inconclusive	◦ MRI Brain without contrast (CPT® 70551) **OR** ◦ MRI Brain without and with contrast (CPT® 70553)
◦ Abnormality identified on MRI Brain without contrast (CPT® 70551)	◦ MRI Brain with contrast (CPT® 70552) **OR** ◦ MRI Brain without and with contrast (CPT® 70553)

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Indications	Medically Necessary Imaging Study
◦ Headache precipitated by coughing, sneezing, physical exertion, or Valsalva ◦ Thunderclap headache ◦ Individual with hypercoagulable state or bleeding disorder	◦ MRI Brain without contrast (CPT® 70551) **OR** ◦ MRI Brain without and with contrast (CPT® 70553) **AND/OR** ◦ MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** ◦ CTA Head (CPT® 70496)
◦ Papilledema on physical exam ◦ Focal signs and/or symptoms of bruit, dissection, vertebrobasilar insufficiency, and/or positional changes	◦ MRI Brain without contrast (CPT® 70551) **OR** ◦ MRI Brain without and with contrast (CPT® 70553) **AND/OR** ◦ MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** ◦ CTA Head (CPT® 70496) **OR** ◦ MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) For requests of MRA OR CTA AND MRV, see **Pediatric Head Imaging Modality General Considerations (PEDHD-1.3)**.

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Indications	Medically Necessary Imaging Study
◦ Urgent/Emergent settings ◦ Sudden severe headache including thunderclap headache ◦ Acute setting of suspected intracranial infection prior to lumbar puncture (CT Head with contrast CPT® 70460 if intracranial spread of disease is suspected, to detect suppurative fluid collections) (See **General Guidelines-Other Imaging Situations (PEDHD-1.4)**) ◦ Concern for new hemorrhage, significant mass effect, or hydrocephalus and/or rapid clinical deterioration ◦ Recent head trauma ◦ Suspected skull or other bony involvement ◦ If MRI is contraindicated ◦ Ventriculoperitoneal shunt with suspected shunt malfunction. See **Macrocephaly, Microcephaly, and Hydrocephalus (PEDHD-7)** for additional imaging.	◦ CT Head without contrast (CPT® 70450) *CT Head permitted even with prior MRI Brain imaging.*

- If concern for CNS infection, see **CNS Infection (PEDHD-29)**.

Background and Supporting Information

- Headache is a very common complaint in school aged children and adolescents. Many of these children have a family history of one of the primary headache disorders, such as migraine or tension headache.
- CT Head poorly visualizes the posterior fossa in children and is generally insufficient to evaluate pediatric headaches in the absence of supported indications. CT is not supported in lieu of MRI solely to avoid sedation. See **Pediatric Head Imaging Modality General Considerations (PEDHD-1.3)**.

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Pediatric Head and Face Trauma (PEDHD-4)

Guideline

Head Trauma (PEDHD-4.1)
Facial Trauma (PEDHD-4.2)
References (PEDHD-4)

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Head Trauma (PEDHD-4.1)

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Criteria

- In individuals with recent head trauma, a history focused on the incident and careful examination of the head, neck, and neurological function should be performed since the onset or change in signs and/or symptoms prior to considering advanced imaging.
- Advanced imaging is considered medically necessary for children with head trauma with ANY of the following red flags:
  - Loss of consciousness
  - Altered mental status or abnormal behavior
  - Known or suspected skull fracture
  - Glasgow Coma Score <15
  - Age younger than 2 years
  - Vomiting
  - Severe mechanism of injury, including, but not limited to:
    - Motor vehicle crash with patient ejection
    - Motor vehicle crash with death of another passenger
    - Motor vehicle crash with rollover
    - Pedestrian or bicyclist without helmet struck by a motorized vehicle
    - Head struck by a high-impact object
    - Falls of more than 1.5m (5 feet) for children aged 2 years and older and more than 0.9m (3 feet) for those younger than 2 years
  - Severe or worsening headache
  - Amnesia
  - Non-frontal scalp hematoma
- CT Head without contrast (CPT® 70450) is the primary advanced imaging study in individuals with acute head trauma.
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is medically necessary for the following:
  - Children with an abnormal neurological exam that is not explained by the CT findings
  - Subacute (8 days to one month after initial traumatic event) or chronic blunt head trauma with new or worsening neurological signs or cognitive symptoms
  - Children suspected of being the victims of physical abuse. See **Suspected Physical Child Abuse (PEDMS-7)** in the Pediatric Musculoskeletal Imaging Guidelines.

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- For facial trauma, see **Facial Trauma (PEDHD 4.2)** in the Pediatric Head imaging Guidelines.
- For neck injury, see **Spine Pain Related to Trauma and Painless Spine Trauma (PEDSP 2.6)** in Pediatric Spine Imaging Guidelines.
- Repeat and follow-up imaging can be done at the discretion of the ordering provider.

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Facial Trauma (PEDHD-4.2)

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Criteria

- CT Maxillofacial without contrast (CPT® 70486)

AND/OR

- CT Orbital/Facial/Temporal Bone without contrast (CPT® 70480) **OR** MRI Orbits/Face/Neck (CPT® 70540)

AND/OR

- CT Head without contrast (CPT® 70450) **OR** MRI Brain without contrast (CPT® 70551)
- Repeat and follow-up imaging can be done at the discretion of the ordering provider.
- For additional concerns, see **Facial Trauma (HD-13.2)** in the Head Imaging Guidelines.

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Sinusitis and Allergic Rhinitis (PEDHD-5)

Guideline

Sinus And Facial Imaging General Considerations (PEDHD-5.1)
Imaging Indications in Sinusitis (PEDHD-5.2)
Stereotactic CT Localization (CPT® 77011) (PEDHD-5.3)
Requests for both Head and Sinus Imaging (PEDHD-5.4)
Allergic Rhinitis (PEDHD-5.5)
Other Indications for Sinus Imaging (PEDHD-5.6)
References (PEDHD-5)

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Sinus And Facial Imaging General Considerations (PEDHD-5.1)

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Criteria

- Acute sinusitis is a clinical diagnosis, and imaging is considered not medically necessary to establish a diagnosis. Acute bacterial sinusitis can be presumptively diagnosed in a child with acute upper respiratory infection (URI) symptoms and any of the following:
  - Persistent symptoms lasting >10 days without improvement
  - Worsening symptoms after initial period of improvement
  - Severe symptoms including purulent nasal discharge and fever >102.2°F for at least 3 consecutive days

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Imaging Indications in Sinusitis (PEDHD-5.2)

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Criteria

- Mild mucosal thickening in the paranasal sinuses or mastoids is an extremely common incidental finding noted on head imaging studies done for other indications. If there are no other abnormalities of facial structures noted, this finding is not an indication for advanced imaging of the sinuses or temporal bone.
- CT Maxillofacial without contrast (CPT® 70486) is considered medically necessary if ANY of the following is present:
  - No improvement after 10 days of appropriate antibiotic treatment (generally this will be amoxicillin/clavulanate, amoxicillin, cefdinir, cefuroxime, cefpodoxime, or ceftriaxone)
  - Recurrence of a treated infection within 8 weeks of effective treatment
  - Chronic sinusitis (persistent residual URI symptoms, including nasal obstruction, facial pressure/pain or cough for over 90 days)
  - Known or suspected fungal sinusitis
    - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary if requested instead of CT Maxillofacial.
  - Pre-operative evaluation to assess surgical candidacy
- CT Maxillofacial with contrast (CPT® 70487) is considered medically necessary if ANY of the following is present:
  - Orbital or facial cellulitis
  - Proptosis
  - Abnormal visual examination
  - Ophthalmoplegia
  - Immunocompromised individual
  - Fungal or vascular lesions visualized in nasal cavity
- CT Head with contrast (CPT® 70460) **OR** MRI Brain without and with contrast (CPT® 70553) **OR** MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary if ANY of the following are present:
  - Focal neurologic findings
  - Altered mental status
  - Seizures
  - Concern for orbital complications

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  - Concern for invasive fungal sinusitis
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **OR** CTA Head (CPT® 70496) is considered medically necessary with these findings as well if there is clinical concern for associated vascular complications including but not limited to mycotic aneurysm or venous sinus thrombosis.
- Repeat sinus imaging is generally considered not medically necessary for individuals who have responded satisfactorily to treatment but is considered medically necessary with clear documentation of the need for updated CT results to direct acute individual care decisions.

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Stereotactic CT Localization (CPT® 77011) (PEDHD-5.3)

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Criteria

- Stereotactic CT localization is frequently obtained prior to sinus surgery. The dataset is then loaded into the navigational workstation in the operating room for use during the surgical procedure. The information provides exact positioning of surgical instruments with regard to the individual's 3D CT images. In most cases, the pre-operative CT is a technical-only service that does not require interpretation by a radiologist.
- For treatment planning for sinus surgery CPT® 77011: A stereotactic CT localization scan is frequently obtained prior to sinus surgery. The dataset is then loaded into the navigational workstation in the operating room for use during the surgical procedure. The imaging facility should report CPT® 77011 when performing a scan not requiring interpretation by a radiologist.
- If a diagnostic scan is performed and interpreted by a radiologist, the appropriate diagnostic CT code (e.g., CPT® 70486) should be used.
- It is not appropriate to report both CPT® 70486 and CPT® 77011 for the same CT stereotactic localization imaging session.
- 3D Rendering (CPT® 76376 or CPT® 76377) should not be reported in conjunction with CPT® 77011 (or CPT® 70486 if used). The procedure inherently generates a 3D dataset.
- Such operative studies are considered medically necessary when ordered by the operating surgeon for this purpose.

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Requests for both Head and Sinus Imaging (PEDHD-5.4)

HDP.AR.0005.4.A
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Criteria

- CT Head does not visualize all of the sinuses.
- MRI Brain provides excellent visualization of the sinuses sufficient to recognize sinusitis, and addition of sinus CT for this purpose is unnecessary.
- In individuals being evaluated for potential sinus surgery, separate CT Sinus is often appropriate even after an MRI Brain in order to visualize obstructions to spontaneous mucus flow. See **Stereotactic CT Localization (CPT® 77011) (PEDHD-5.3)**.
- Separate head imaging is considered not medically necessary in individuals with a normal neurological examination who have headaches associated with sinus symptoms.
- CT or MRI Sinus is not considered medically necessary for the evaluation of headaches or neurological complaints without a more specific indication pointing to a sinus etiology.

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Allergic Rhinitis (PEDHD-5.5)

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Criteria

- Advanced imaging is considered not medically necessary for diagnosis or management of individuals with uncomplicated allergic rhinitis.

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Other Indications for Sinus Imaging (PEDHD-5.6)

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Criteria

- See **Facial Trauma (PEDHD-4.2)** for imaging guidelines in trauma.
- CT Maxillofacial without contrast (CPT® 70486) - Congenital anomalies of facial structures.
- Cleft lip and palate can be associated with brain malformations and abnormal brain development.
  - MRI Brain (CPT® 70551) is considered medically necessary in cases of cleft lip and/or palate.
  - MRI Orbits/Face/Neck without contrast (CPT® 70540) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is appropriate if requested by surgeon or any provider in consultation with the surgeon. See **Facial Anomalies (PEDHD-8.2)**.
- 3D CT reconstructed images (CPT® 76377 **OR** CPT® 76376) in conjunction with routine CT should be an integral part of the examination in evaluating craniofacial abnormalities.
- CT Maxillofacial without and with contrast (CPT® 70488) **OR** MRI Orbits/Face/Neck without and with contrast (CPT® 70543) - Tumors or other disorders of facial structures.
- Obstructive sleep apnea - See **Pediatric Sleep Disorders (PEDHD-24.1)** for imaging guidelines.
- See **Sinus and Facial Imaging (HD-29)** for conditions not addressed in **Sinus and Facial Imaging (PEDHD-5)**.

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Epilepsy and Other Seizure Disorders (PEDHD-6)

Guideline

Epilepsy and Other Seizure Disorders (PEDHD-6.0)
Initial Imaging of Non-Febrile Seizures (PEDHD-6.1)
Repeat Imaging Indications (PEDHD-6.2)
Special Imaging Studies in Evaluation for Epilepsy Surgery (PEDHD-6.3)
Febrile Seizures (PEDHD-6.4)
References (PEDHD-6)

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Epilepsy and Other Seizure Disorders (PEDHD-6.0)

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Criteria

- A pertinent evaluation including a detailed history, physical examination with a thorough neurologic examination, since the onset or change in signs and/or symptoms, and appropriate laboratory studies should be performed prior to considering the use of an advanced imaging (CT, MRI, Nuclear Medicine) procedure. An exception can be made if the individual is undergoing guideline-supported, scheduled follow-up imaging evaluation or request is from or in consultation with a neurologist or neurosurgeon who has seen the individual since onset of symptoms. This clinical evaluation should also include family history and (whenever possible) the accounts of eyewitnesses to the event(s).

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Initial Imaging of Non-Febrile Seizures (PEDHD-6.1)

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Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for the following:
  - First-time seizure in child that has no known cause and is not associated with fever
  - Focal onset seizures
  - New onset primary generalized epilepsy (e.g., absence epilepsy or juvenile myoclonic epilepsy) in those who are neurologically abnormal (e.g., developmental delay)
  - Focal neurologic deficits
  - Inconclusive findings on recent cranial ultrasound or CT Head
    - If an individual meets criteria for MRI imaging for initial imaging of non-febrile seizure, MRI is considered medically necessary even with a recent negative CT.
  - Concern for a mass lesion or demyelinating disease
- CT Head without contrast (CPT® 70450) is considered medically necessary for the following (and does not preclude MRI imaging when requested):
  - First-time seizure in child associated with recent head trauma
  - Individual cannot safely undergo MRI (avoidance of sedation is not an indication) or in urgent situations
  - Concern for blood and/or calcifications
- Cranial ultrasound (CPT® 76506) for the following:
  - First-time seizure in child under 30 days of age that has no known cause and is not associated with fever if the infant has an open fontanelle.
  - Cranial ultrasound is not required before MRI Brain for hypoxic ischemic encephalopathy (HIE) and/or congenital malformations.

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Repeat Imaging Indications (PEDHD-6.2)

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Criteria

- Repeat MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for the following:
  - Need to perform MRI using Epilepsy Protocol (typically 3T magnet with thin section angled slices through hippocampus and temporal lobes, either without or without and with contrast)
  - New or worsening focal neurologic deficits
  - Drug-resistant epilepsy (DRE) (See **Background and Supporting Information** below.)
  - Change in seizure type
  - Repeat imaging for persistent seizures as requested by a specialist or any provider in consultation with a specialist
  - MRI Brain with contrast (CPT® 70552) **OR** MRI Brain without and with contrast (CPT® 70553) to clarify an abnormality on non-contrast MRI or if considering infection or inflammation

Background and Supporting Information

- DRE occurs when there is failure of 2 antiseizure medications (ASMs).
- DRE can also be referred to as "refractory", "intractable," and/or "pharmacoresistant" epilepsy.

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Special Imaging Studies in Evaluation for Epilepsy Surgery (PEDHD-6.3)

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Criteria

- For individuals with a previous MRI Brain and documentation of intractable epilepsy for which surgical treatment or another interventional modality is under active consideration , any or all of the following requests can be obtained concurrently and are considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast 3T/7T (CPT® 70553) **AND/OR**
  - Ictal SPECT (CPT® 78803 or CPT® 78830) **AND/OR**
  - Functional MRI (f-MRI) (CPT® 70555 or CPT® 70554) See **Functional MRI (fMRI) (HD-24.2)** in the Head Imaging Guidelines **AND/OR**
  - MR Spectroscopy (CPT® 76390)
  - Metabolic (FDG) PET Brain (CPT® 78608) **AND/OR**
  - CTA Head (CPT® 70496) OR MRA Head (CPT® 70544, CPT® 70545 or CPT® 70546) **AND/OR**
  - CTA Neck (CPT® 70498) OR MRA Neck without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549) OR
  - CTA Head and Neck (CPT® 70471) if performed during the same session **AND/OR**
  - 3D rendering CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) is not necessary for epilepsy surgery alone, since 3D rendering can be obtained as part of the MRI Brain epilepsy protocol, unless complicated surgical repair considerations involving craniotomy are required.
  - Metabolic PET/MRI is MRI Brain without contrast (CPT® 70551) OR MRI Brain without and with contrast (CPT® 70553) co-registered with FDG-PET Brain (CPT® 78608) and is considered medically necessary for pre-surgical evaluation of refractory seizure when requested by neurosurgeon or neurologist or any provider in consultation with a neurosurgeon or neurologist.
- For additional imaging requests for surgery, see **Neurosurgical Imaging (HD-28)** in the Head Imaging Guidelines and/or **Primary Central Nervous System Tumors – General Considerations (ONC 2.1)** in the Oncology Imaging Guidelines.

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- For intracranial monitoring with stereo-EEG or grids/strips and electrodes, additional imaging for neuronavigation is considered medically necessary with one each of the following, after consulting the health plan direction for unlisted codes:
  - MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551)
  - CT Head, contrast as requested
  - Due to variances with techniques currently available for neuronavigation, the following are considered medically necessary:
    - CTA Head (CPT® 70496) **OR** MRA Head (CPT® 70544, CPT® 70545 or CPT® 70546)
- Repeat diagnostic head imaging is considered medically necessary if previous head imaging is inadequate or additional sequences/protocols are required (including epilepsy protocol imaging) or previous imaging is greater than 6 months old.
- Post-operative imaging including after intracranial (EEG) monitoring is considered medically necessary per neurosurgeon's request.

Background and Supporting Information

Examples of epilepsy surgery and other interventional modalities include but are not limited to:

- Focal resection
- Temporal lobe resection
- Extratemporal resection
- Lesionectomy
- Multiple subpial transections
- Laser Interstitial Thermal Therapy (LITT)
- Anatomical or functional hemispherectomy and hemispherotomy
- Corpus callostomy
- Steretactic radiosurgery (SRS)
- Neurostimulation device implantations including the following:
  - Vagus nerve stimulation (VNS)
  - Responsive neurostimulation (RNS)
  - Deep brain stimulation (DBS)
- Magnetoencephalography (MEG) plays an important role in clarifying the significance of abnormalities seen on both structural and functional imaging, for the purpose of epileptogenic zone localization for surgical planning. When used in conjunction with other techniques, MEG plays a major role in the non-invasive epilepsy surgery evaluation. Currently, the guidelines only require review for the MRI co-registered with MEG. MEG followed by co-registration with MRI Brain is referred to as Magnetic Source Imaging (MSI).

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Febrile Seizures (PEDHD-6.4)

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Criteria

- Neuroimaging should not be performed in the routine evaluation of children with simple febrile seizures.
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for febrile seizures in the presence of one or more of the following:
  - Seizure lasting over 15 minutes
  - Focal onset seizures
  - Focal neurologic deficits
  - Multiple seizures within 24 hours
  - Macrocephaly (head circumference that is greater than the 97th percentile for age and sex, established by use of measurements and CDC growth charts. See **Macrocephaly (PEDHD-7.1)**)
  - Signs and symptoms of increased intracranial pressure
  - Developmental delay
  - MRI Brain permitted even with prior CT Head imaging
- CT Head without contrast (CPT® 70450) **OR** CT Head without and with contrast (CPT® 70470) is considered medically necessary for:
  - Concern for calcifications
  - For additional indications for CT Head, see **Pediatric Head Imaging Modality General Considerations (PEDHD-1.3)**.

Background and Supporting Information

A typical (simple) febrile seizure is a generalized seizure that occurs in a young child between 6 months and 5 years of age, in association with a fever greater than or equal to 38°C (100.4°F), without evidence of central nervous system infection or another identifiable cause (Subcommittee on Febrile Seizures, & American Academy of Pediatrics, 2011).

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Macrocephaly, Microcephaly, and Hydrocephalus (PEDHD-7)

Guideline

Macrocephaly (PEDHD-7.1)
Microcephaly (PEDHD-7.2)
Hydrocephalus, Shunts, and Endoscopic Third Ventriculostomy (ETV) (PEDHD-7.3)
References (PEDHD-7)

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Macrocephaly (PEDHD-7.1)

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Criteria

Indications	Age or Condition	Medically Necessary Imaging Study
Head circumference that is greater than the 97th percentile for age and sex, or head circumference increasing in percentiles over two visits established by use of measurements and CDC growth charts (cdc.gov).	Birth to age 6 months or open fontanelle	• Ultrasound Head (CPT® 76506)
	Hydrocephalus or hemorrhage is present on ultrasound	• CT Head without contrast (CPT® 70450)
	Any abnormality seen on ultrasound	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) *MRI Brain permitted even with prior CT Head imaging*.
	Greater than 6 months old or closed fontanelle	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) *CT is considered not medically necessary in this age group since uncomplicated hydrocephalus is less likely after early infancy.*

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Background and Supporting Information

- Macrocephaly is defined as head circumference that is greater than the 97th percentile for age and sex, or head circumference increasing in percentiles over two visits established by use of measurements and CDC growth charts (Centers for Disease Control and Prevention, 2024).

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Microcephaly (PEDHD-7.2)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for all individuals with head circumference that is less than the 3rd percentile for age and sex, or head circumference decreasing in percentiles over two visits established by use of measurements and CDC growth charts (cdc.gov).
  - CT is generally not recommended as that modality lacks the sensitivity to detect the relevant anatomical abnormalities.
  - For CT Head indications, see **Pediatric Head Imaging Modality General Considerations (PEDHD-1.3)**.

Background and Supporting Information

- Microcephaly is defined as head circumference that is less than the 3rd percentile for age and sex, or head circumference decreasing in percentiles over two visits established by use of measurements and CDC growth charts (Centers for Disease Control and Prevention, 2024).

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Hydrocephalus, Shunts, and Endoscopic Third Ventriculostomy (ETV) (PEDHD-7.3)

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Criteria

Initial Imaging

Indication	Medically Necessary Imaging Study
Age 0-6 months	• Screening Ultrasound Head examination (CPT® 76506) • If ultrasound shows hydrocephalus, MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551)
Greater than 6 months old	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)
Siblings of individuals with aqueductal stenosis (familial screening for hydrocephalus is otherwise considered not medically necessary)	• One-time CT Head without contrast (CPT® 70450) **OR** • Rapid MRI Brain without contrast (CPT® 70551)

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Repeat Imaging in the Setting of VP Shunt and/or ETV

Indication	Medically Necessary Imaging Study
New signs or symptoms suggesting shunt malfunction or ETV malfunction, including (but not limited to): • Sepsis • Decreased level of consciousness • Protracted vomiting • Visual or neurologic deterioration • Decline of mentation after initial improvement • New or changing pattern of seizures	• Rapid MRI Brain without contrast (CPT® 70551) **OR** • CT Head without contrast (CPT® 70450)
• Post-operatively, or • After shunt setting adjustments, or • As ordered by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon	• Rapid MRI Brain without contrast (CPT® 70551) **OR** • CT Head without contrast (CPT® 70450)

Repeat Imaging of Ventriculomegaly

Indication	Medically Necessary Imaging Study
0-6 months old	• Serial US Head (CPT® 76506) to monitor ventricular size to determine need and timing of placement of a ventricular catheter, or performance of an endoscopic third ventriculostomy (ETV), timing as requested by the provider
Older than 6 months	• MRI Brain without and with contrast (CPT® 70553), timing as requested by the provider **OR** • MRI Brain without contrast (CPT® 70551), timing as requested by the provider

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Abdominal Imaging Indications in the Setting of VP Shunts

Indication	Medically Necessary Imaging Study
• Suspicion of CSF pseudocyst formation or distal shunt outlet obstruction • Surveillance imaging of the abdomen is considered medically necessary if ordered by a neurologist, neurosurgeon, or interventional radiologist, or in consultation with one of these providers	• Ultrasound Abdomen (CPT® 76700) **AND/OR** • CT Abdomen **OR** CT Abdomen and Pelvis, contrast as requested

Spine Imaging

Indication	Medically Necessary Imaging Study
Including, but not limited to the following: • Chiari malformation • Malignant infiltration of meninges	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR** • MRI Lumbar Spine without and with contrast (CPT® 72158) **OR** • MRI Lumbar Spine without contrast (CPT® 72148)

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Indication	Medically Necessary Imaging Study
Dandy-Walker malformation	• MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141)

- For hydrocephalus due to choroid plexus papillomas, see **Choroid Plexus Tumors (PEDONC-4.13)** in the Pediatric and Special Populations Oncology Imaging Guidelines for those lesions.
- For CSF flow imaging, see **CSF Flow Imaging (HD-24.4)** in the Head Imaging Guidelines.

Additional Rarely Used Studies

- Cisternogram (CPT® 78630) is rarely done in children, but is considered medically necessary for the following:
  - Known hydrocephalus with worsening symptoms
  - Suspected obstructive hydrocephalus
  - Suspected normal pressure hydrocephalus with gait disturbance and either dementia or urinary incontinence
- Cerebrospinal Ventriculography (CPT® 78635) is rarely done in children, but is considered medically necessary for the following:
  - Evaluation of internal shunt, porencephalic cyst, or posterior fossa cyst
- Nuclear Medicine Shunt Evaluation (CPT® 78645) and CSF Flow SPECT (CPT® 78803) are rarely done in children, but are considered medically necessary for the following:
  - Suspected malfunction of ventriculoperitoneal, ventriculopleural, or ventriculovenous shunts

Background and Supporting Information

- Head ultrasound can be performed while the fontanelles are still open and has excellent spatial and anatomic resolution, particularly within the first 2 months of life. After 6 months, smaller acoustic windows due to closing fontanelles limit the sensitivity of the examination.
- Rapid MRI Brain without contrast (CPT® 70551) provides more anatomical detail and does not involve radiation exposure, but many providers use CT Head, as rapid MRI is not universally available.

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- Hydrocephalus is traditionally divided into non-communicating (the obstruction lies within the course of the brain's ventricular system) and communicating (the obstruction is distal to the ventricular system).
- Ventriculomegaly refers to enlarged ventricular spaces. It is often initially found on fetal ultrasound. It can be from an obstructive cause or can be relative secondary to small brain volume.
- Benign enlargement of the subarachnoid space in infancy (BESSI), also called benign external hydrocephalus or benign extra-axial fluid collections is the rapid increase in head circumference in an infant with enlarged frontal subarachnoid spaces. See **Macrocephaly (PEDHD-7.1)** for initial imaging guidelines. It typically requires no intervention. Once diagnosed and confirmed with MRI Brain, no additional imaging is required unless new neurological symptoms appear, worsen, or persist beyond age 4 years. If developmental motor delay, see **Developmental Motor Delay (PEDHD 19.3)**.

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Craniofacial Anomalies (PEDHD-8)

Guideline

Craniosynostosis Imaging (PEDHD-8.1)
Facial Anomalies (PEDHD-8.2)
References (PEDHD-8)

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Craniosynostosis Imaging (PEDHD-8.1)

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Criteria

- Skull x-rays and/or ultrasound should be obtained prior to considering advanced imaging. In cases of very strong consideration of craniosynostosis with surgical planning in progress, x-rays and/or ultrasound are not required.
- CT Head without contrast (CPT® 70450) is considered medically necessary in the diagnosis of craniosynostosis, with reported sensitivity near 100%. CT also detects associated intracranial pathology.
- 3D rendering (CPT® 76376 or CPT® 76377) is considered medically necessary with the initial diagnostic CT to evaluate the extent of synostosis and determine surgical candidacy or for preoperative planning.
- CT Maxillofacial without contrast (CPT® 70486) **AND** CT Orbits/Temporal Bone without contrast (CPT® 70480) are generally considered not medically necessary to evaluate individuals with craniosynostosis, but are considered medically necessary if the craniosynostosis is part of a larger congenital defect which also involves the bones of the face or orbit.
- CT Maxillofacial without contrast (CPT® 70486) **AND/OR** CT Orbits/Temporal Bone without contrast (CPT® 70480) is/are considered medically necessary in certain types of craniosynostosis and is/are considered medically necessary when ordered by surgical specialties or in consultation with surgical specialties during surgical evaluation and planning.
- Ultrasound Head (CPT® 76506) is considered medically necessary as an alternative method of assessing sutural patency in neonates and infants when radiographs are indeterminate. If inconclusive or for pre-operative planning, CT with 3D rendering is considered medically necessary as discussed previously in this section.
- CT Head without contrast (CPT® 70450) is considered medically necessary post-operatively at the discretion of or in consultation with the surgical specialist coordinating the individual's care.
- Positional plagiocephaly typically does NOT require advanced imaging.

Background and Supporting Information

- Craniosynostosis is the premature closure of one or more cranial sutures, usually during infancy.
- Craniosynostosis may be caused by a genetic condition, such as Apert, Pfeiffer, or Crouzon syndrome to name a few (Wenger, Miller, & Evans, 2020).
- Abnormal head shape is the common clinical feature.

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Facial Anomalies (PEDHD-8.2)

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Criteria

- Congenital anomalies of facial structures
  - CT Maxillofacial without contrast (CPT® 70486) **OR** MRI Orbits/Face/Neck without contrast (CPT® 70540) **OR** MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
  - MRI Brain without contrast (CPT® 70551) is considered medically necessary in individuals with cleft lip and/or palate and encephalocele.
- See also **Craniosynostosis Imaging (PEDHD-8.1)**.

Background and Supporting Information

- Facial anomalies (such as cleft lip and palate) can be associated with brain malformations and abnormal brain development.
- Congenital anomalies of facial structures can include, but are not limited to:
  - Cleft lip/palate
  - Choanal atresia
  - Facial clefting
  - CHARGE syndrome
  - Nasofrontal dermoid
  - Encephalocele

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Chiari and Skull Base Malformations (PEDHD-9)

Guideline

Chiari Malformations (PEDHD-9.1)
Basilar Impression/Basilar Invagination (PEDHD-9.4)
Platybasia (PEDHD-9.5)
References (PEDHD-9)

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Chiari Malformations (PEDHD-9.1)

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Criteria

- Ultrasound can be utilized for initial examination in infants to determine ventricular size and associated anomalies and to provide a baseline for follow-up evaluation but is not required prior to MRI.

Indication	Medically Necessary Imaging Study
◦ Initial evaluation for suspected or known Chiari malformations	Any of the following sets of imaging: MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR** MRI Cervical Spine without contrast (CPT® 72141) **OR** MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** MRI Thoracic Spine without contrast (CPT® 72146) **OR** MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR** MRI Lumbar Spine without contrast (CPT® 72148) **OR** MRI Lumbar Spine without and with contrast (CPT® 72158)

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Indication	Medically Necessary Imaging Study
◦ Repeat imaging for any of the following: ▪ At the discretion of or in consultation with the neurologist and/or neurosurgeon coordinating the individual's care ▪ New or worsening signs or symptoms ▪ Surgical procedure is actively being considered	Any of the following sets of imaging: MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR** MRI Cervical Spine without contrast (CPT® 72141) **OR** MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** MRI Thoracic Spine without contrast (CPT® 72146) **OR** MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR** MRI Lumbar Spine without contrast (CPT® 72148) **OR** MRI Lumbar Spine without and with contrast (CPT® 72158)

- Familial screening is considered not medically necessary for Chiari I Malformations.
- For CSF flow imaging, see **CSF Flow Imaging (HD-24.4)** in the Head Imaging Guidelines.

Background and Supporting Information

- Chiari I malformations involve caudal displacement or herniation of the cerebellar tonsils. Chiari I may be associated with syringomyelia, and rarely with hydrocephalus. Most cases are asymptomatic and discovered incidentally on a head scan performed for another indication. When symptoms are present, they are usually nonspecific but can include headache, lower cranial nerve palsies, or sleep apnea.
- Chiari II malformations are more severe than Chiari I malformations. These individuals usually present at birth. Myelomeningocele is always present, and syringomyelia and hydrocephalus are extremely common.
- Chiari III malformations include cerebellar herniation into a high cervical myelomeningocele. Chiari IV malformations refer to complete cerebellar agenesis.

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Both Chiari III and IV malformations are noted at birth and are rarely compatible with life.

- Repeat brain and spine imaging in individuals with Chiari I malformations and known syringomyelia or hydromyelia is highly individualized.

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Basilar Impression/Basilar Invagination (PEDHD-9.4)

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- See **Basilar Impression/Basilar Invagination (HD-5.4)** in the Head Imaging Guidelines.

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Platybasia (PEDHD-9.5)

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- See **Platybasia (HD-5.5)** in the Head Imaging Guidelines.

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Intracranial Aneurysms and AVM (PEDHD-10)

Guideline

Pediatric Intracranial Aneurysms and Subarachnoid Hemorrhage (PEDHD-10.1)
Pediatric Intracranial Arteriovenous Malformations (AVM) (PEDHD-10.2)
References (PEDHD-10)

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Pediatric Intracranial Aneurysms and Subarachnoid Hemorrhage (PEDHD-10.1)

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Criteria

- A pertinent evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the individual is undergoing guideline-supported scheduled follow-up imaging evaluation or request is from a neurologist or neurosurgeon who has seen the individual since onset of symptoms.
- MRI Brain permitted even with prior CT Head imaging.
- MRI Perfusion is obtained with MRI Brain (CPT® 70551 **OR** CPT® 70552 **OR** CPT® 70553).
  - No additional CPT® codes are necessary or appropriate to perform MRI perfusion.
- Initial study for suspected subarachnoid hemorrhage:
  - CT Head without contrast (CPT® 70450) **AND/OR**
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553)
- If subarachnoid hemorrhage is present on CT or MRI, or lumbar puncture findings suggest hemorrhage, then the following is/are considered medically necessary:
  - MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR**
  - CTA Head (CPT® 70496) **AND/OR**
  - CT Brain Perfusion (CPT® 70472 or 70473) or MRI Brain Perfusion (CPT® 70553)
- Initial study for suspected intracranial aneurysm - individuals presenting with headache, increased intracranial pressure, seizures, or focal neurologic findings:
  - CT Head without contrast (CPT® 70450) **AND/OR**
  - MRI Brain without contrast (CPT® 70551) **OR**
  - MRI Brain without and with contrast (CPT® 70553)
- If findings suspicious for intracranial aneurysm on prior imaging, then the following is supported:
  - MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR**
  - CTA Head (CPT® 70496)
- Imaging for individuals with known aneurysm presenting with headache, increased intracranial pressure, seizures, or focal neurologic findings:
  - CT Head without contrast (CPT® 70450) **AND/OR**
  - MRI Brain without contrast (CPT® 70551) **OR**

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  - MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - MRA Head (CPT® 70544, CPT® 70545 **OR** CPT® 70546) **OR**
  - CTA Head (CPT® 70496)
- CT Head without contrast (CPT® 70450) **AND/OR** MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) **AND/OR** MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** CTA Head (CPT® 70496) (except in the case of multisystemic smooth muscle syndrome (MSMS)/smooth muscle dysfunction syndrome (SMDS)/ACTA2 mutations, (see **Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ ACTA2 Mutations (HD-21.7**))) is/are considered medically necessary for individuals with headache, increased intracranial pressure, seizures, or focal neurologic findings **AND** any of the following conditions (including but not limited to):
  - Aicardi–Goutières syndrome
  - Alpha-1-antitrypsin deficiency
  - Alpha-glucosidase deficiency
  - Azygos anterior cerebral artery
  - Bicuspid aortic valve
  - Coarctation of the aorta (for screening of intracranial aneurysms, see **Aortic Coarctation and IAA (interrupted aortic arch) (PEDCD-2.4.11)**)
  - Ehlers-Danlos Syndrome
  - Fibromuscular dysplasia
  - Hereditary hemorrhagic telangiectasia (Osler-Weber-Rendu syndrome)
  - Hyper-IgE syndrome
  - Kawasaki disease
  - Klinefelter syndrome
  - Klippel-Trenaunay-Weber syndrome
  - Loeys-Dietz syndrome (there are 4 forms)
  - Marfan syndrome
  - Microcephalic osteodysplastic primordial dwarfism type II
  - Moyamoya syndrome
  - Multisystemic smooth muscle syndrome (MSMS)/smooth muscle dysfunction syndrome (SMDS)/ACTA2 mutations (See **Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations (HD-21.7**)
  - Neurofibromatosis type 1
  - Noonan syndrome
  - Patent ductus arteriosus
  - Pheochromocytoma
  - Pseudoxanthoma elasticum

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  - Polycystic kidney disease
  - Tuberous sclerosis
- The timing of follow-up imaging for intracranial aneurysms in children is similar to that in adults. See **Intracranial Aneurysms (HD-12.1)** in the Head Imaging Guidelines.
- Screening for intracranial aneurysms is considered not medically necessary in individuals with coarctation of the aorta repaired before 3 years of age. See **Intracranial Aneurysms (HD-12.1)** in the Head Imaging Guidelines.
- Screening is considered not medically necessary in asymptomatic individuals under 20 years of age, unless there are 2 or more first-degree relatives with intracranial aneurysm. See **Intracranial Aneurysms (HD-12.1)** in the Head Imaging Guidelines.

Background and Supporting Information

- Unlike adults, the majority of pediatric aneurysms are caused by genetic or developmental defects rather than environmental or lifestyle factors.
- Pediatric aneurysms most commonly present with subarachnoid hemorrhage, headache, increased intracranial pressure, seizure activity, or focal neurologic findings.

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Pediatric Intracranial Arteriovenous Malformations (AVM) (PEDHD-10.2)

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Criteria

- A pertinent evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the individual is undergoing guideline-supported scheduled follow-up imaging evaluation or request is from or in consultation with a neurologist or neurosurgeon who has seen the individual since onset of symptoms.
- Use this guideline for cerebral vascular malformations including arteriovenous, venous, cavernous, and capillary malformations and vein of Galen malformations.

Disorders	Indications (any of the following)	Medically Necessary Imaging Study
• Any cerebral vascular and/or AVM Disorder listed in this guideline	• When MRI is contraindicated • Any emergency setting	• CT Head without contrast (CPT® 70450) **AND/OR** • CTA Head (CPT® 70496) **AND/OR** • CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session

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Disorders	Indications (any of the following)	Medically Necessary Imaging Study
• Suspected Vein of Galen malformation in the neonate	• Confirmation by Ultrasound Head (CPT® 76506)	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **OR** • Catheter Angiography to precisely identify the feeding arteries and draining vein, especially if embolization is planned
• Low flow malformations	• When requested by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon	• MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** • CTA Head (CPT® 70496)
• Suspected AVM after the neonatal period	• When requested by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)

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Disorders	Indications (any of the following)	Medically Necessary Imaging Study
• Known AVM	• When requested by a neurologist or neurosurgeon or any provider in consultation with a neurologist or neurosurgeon	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** • CTA Head (CPT® 70496)
• Hereditary Hemorrhagic Telangiectasia (HHT, Osler-Weber-Rendu syndrome)	• Suspected based on family history with at least one affected first-degree relative. (biological parent or sibling or child) • At diagnosis • Screening for confirmed HHT • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist or neurosurgeon or geneticist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545 **OR** CPT® 70546) **OR** • CTA Head (CPT® 70496)

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Disorders	Indications (any of the following)	Medically Necessary Imaging Study
• Capillary malformation-arteriovenous malformation (CM-AVM)	• Suspected based on family history with at least one affected first-degree relative (biological parent or sibling or child) • At diagnosis • Screening for confirmed CM-AVM • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist or neurosurgeon or geneticist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545 **OR** CPT® 70546) **OR** CTA Head (CPT® 70496) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** MRI Thoracic Spine without contrast (CPT® 72146)

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Disorders	Indications (any of the following)	Medically Necessary Imaging Study
• Cerebral cavernous malformations (CCM)	• Suspected based on family history with at least one affected first-degree relative (biological parent or sibling or child) • At diagnosis • Screening for confirmed CCM • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist or neurosurgeon or geneticist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545 **OR** CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)

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Disorders	Indications (any of the following)	Medically Necessary Imaging Study
• Microcephalic osteodysplastic primordial dwarfism, type II (MOPDII)	• Suspected based on family history with at least one affected first-degree relative (biological parent or sibling or child) • At diagnosis • Screening for confirmed MOPDII, repeated annually • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, geneticist, or any provider in consultation with a neurologist or neurosurgeon or geneticist	• MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRA Neck without contrast (CPT® 70547, CPT® 70548 **OR** CPT® 70549) **OR** • CTA Neck (CPT® 70498) **OR** • CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session
• Sturge-Weber syndrome	• At diagnosis • Clinical signs or symptoms concerning for disease progression • When requested by a neurologist, neurosurgeon, or any provider in consultation with a neurologist or neurosurgeon	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRI Orbits/Face/Neck without and with contrast (CPT® 70543) **OR** • MRI Orbits/Face/Neck without contrast (CPT® 70540)

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Additional indications

- CT Head without contrast (CPT® 70450) is considered medically necessary for ANY one of the following:
  - Mass effect
  - Urgent/emergent settings due to availability and speed of CT
  - Trauma
  - Recent hemorrhage, whether traumatic or spontaneous
  - Prior to lumbar puncture in individuals with cranial complaints
  - Scenarios in which MRI is contraindicated (e.g., pacemakers, ICDs, cochlear implants, aneurysm clips, orbital metallic fragments, etc.)
- Prior CT Head (CPT® 70450) does not exclude indication for MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551).

Background and Supporting Information

- Most intracranial AVMs are congenital, vary widely in their location and type, and are discovered at birth due to associated clinical findings or incidentally later in life. Certain hereditary conditions are associated with an increased risk for AVM development.
- Vascular malformations include arteriovenous, venous, cavernous, and capillary malformations. The vein of Galen malformation is the most common arteriovenous malformation, presenting in neonates with signs of high output congestive heart failure or later in infancy of childhood with signs of hydrocephalus. Low flow venous, cavernous, and capillary malformations may be asymptomatic and discovered incidentally, or they may present in childhood with seizures or neurologic findings secondary to intracranial hemorrhage.
- Hereditary AVMs usually have an autosomal dominant pattern of inheritance (McDonald & Stevenson 2021; Bayrak-Toydemir & Stevenson, 2019).

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Syncope (PEDHD-11)

Guideline

Syncope (PEDHD-11.1)
References (PEDHD-11)

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Syncope (PEDHD-11.1)

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Criteria

- Advanced imaging of the brain is considered not medically necessary for individuals with isolated syncope without focal neurologic findings. See **Syncope (PEDCD-5)** in the Pediatric Cardiac Imaging Guidelines and **Epilepsy and Other Seizure Disorders (PEDHD-6)** for additional imaging considerations.

Background and Supporting Information

- Syncope in children is almost always neurocardiogenic (vasovagal) in nature. Intracranial mass lesions do not cause isolated syncope. Syncope and seizure activity can often be challenging to distinguish for unwitnessed syncope.
- There is no role for advanced neuroimaging for Postural Orthostatic Tachycardia Syndrome (POTS).

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Pediatric Stroke (PEDHD-12)

Guideline

Pediatric Stroke General Considerations (PEDHD-12.1)
Pediatric Stroke Initial Imaging (PEDHD-12.2)
Pediatric Stroke Subsequent Imaging (PEDHD-12.3)
Moyamoya Syndrome/Disease (PEDHD-12.4)
Sickle Cell Disease (PEDHD-12.5)
CNS Vasculitis (PEDHD-12.6)
COVID-19 and Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDHD-12.7)
Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations (PEDHD-12.8)
References (PEDHD-12)

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Pediatric Stroke General Considerations (PEDHD-12.1)

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- Imaging indications are the same for neonates as for older children.
- Children may not present with typical stroke findings.

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Pediatric Stroke Initial Imaging (PEDHD-12.2)

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Criteria

- In the presence of neurological signs and/or symptoms with concern for stroke, **ANY** of the following studies are considered medically necessary:
  - CT Head without contrast (CPT® 70450) **OR** MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553)
  - MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** CTA Head (CPT® 70496)
  - For suspected carotid or vertebral artery dissection, CTA Neck (CPT® 70498) **OR** MRA Neck (CPT® 70547, CPT® 70548, **OR** CPT® 70549) **OR**
  - CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session.
  - Note: Both MRA **OR** CTA Head **AND** Neck are needed to visualize the posterior vertebrobasilar circulation for evaluation of the vertebrobasilar stroke/TIA (vertigo associated with diplopia, dysarthria, bifacial numbness or ataxia) or concern for arterial dissection (risks may include premature stroke [under age 50], head or neck trauma, fibromuscular dysplasia, Ehlers-Danlos syndrome, and chiropractic neck manipulation)
- In individuals with COVID-19, see **COVID-19 and Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDHD-12.7)**

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Pediatric Stroke Subsequent Imaging (PEDHD-12.3)

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Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for any new or worsening neurological findings or seizure activity.
- Repeat imaging for follow-up and resolution of stroke or hemorrhage as determined by a neurologist, neurosurgeon, hematologist, or physiatrist (PM&R), or any provider in consultation with a neurologist, neurosurgeon, hematologist, or physiatrist (PM&R).
  - MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553)
  - MRA Head/MRV Head (CPT® 70544, CPT® 70545 **OR** CPT® 70546) **OR** CTA Head/CTV Head (CPT® 70496) for follow-up of known cerebral artery stenosis or thrombosis
  - Other surveillance imaging indications after stroke are listed in the disease-specific sections.

Background and Supporting Information

- CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography):
  - If arterial and venous CT or MR studies are both performed in the same session, only **one** CPT® code is used to report both procedures.
  - If an arterial CTA **OR** MRA study has been performed and subsequently a repeat study is needed to evaluate the venous anatomy, then this study is considered medically necessary.
  - If a venous CTV **OR** MRV study has been performed and subsequently a repeat study is needed to evaluate the arterial anatomy, then this study is considered medically necessary.
  - MRA without and with contrast with venous sinus thrombosis to differentiate total from subtotal occlusion

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Moyamoya Syndrome/Disease (PEDHD-12.4)

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- See **Moyamoya Syndrome/Disease (HD-21.5)** in the Head Imaging Guidelines.

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Sickle Cell Disease (PEDHD-12.5)

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Criteria

- The following imaging is considered medically necessary for all sickle cell individuals with a severe phenotype (Hgb SS or Hgb $S\beta^0$):
  - Transcranial Doppler (TCD) Ultrasound (CPT® 93886 or CPT® 93888) annually for all individuals aged 2 to 16:
    - A short interval repeat study is considered medically necessary for individuals with conditional (170-199cm/sec) flow results, or with individuals undergoing transfusion therapy.
  - Transcranial Doppler (TCD) Ultrasound (CPT® 93886 or CPT® 93888) for children aged 17 years old may be appropriate on a case-by-case basis.
    - See also **Stroke/TIA (HD-21.1)** in the Head Imaging Guidelines.
  - After 17 years old, for individuals with a history of abnormal TCDs, TCDs may be repeated every 3 months.
  - TCD is considered not medically necessary for individuals with other phenotypes (Hgb SC, Hgb $S\beta^+$).
  - See indications below for advanced imaging with MR or CT.
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for any of the following:
  - Two non-imaging Transcranial Doppler (TCD) measurements of greater than or equal to 200cm/sec or a single measurement of greater than 220cm/sec or 2 assessment TCD measurements greater than or equal to 185cm/sec or a single measurement greater than 205cm/sec.
  - Persistently abnormal TCD velocities
  - Screening to detect silent cerebral infarcts
  - New symptoms or cognitive impairment occurs or a change in academic performance
  - After an infarct-like lesion is identified, repeat every 12-24 months to assess for cerebral infarct progression
  - Prior to any change in therapy

Background and Supporting Information

- TCD is used to screen for overt and silent infarctions and monitor response to transfusion therapy.
- Individuals with sickle cell disease are at significantly increased risk for stroke and silent infarction, beginning at a very young age. Recent advances allow physicians

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to identify individuals at high risk for stroke and begin a primary stroke prevention program.

- Identification of silent cerebral infarction is important because treatment with prophylactic red cell transfusions to maintain hemoglobin S levels at under 30% of total hemoglobin may reduce recurrent stroke and extent of neurologic damage.

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CNS Vasculitis (PEDHD-12.6)

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Criteria

- Medically necessary initial imaging for concern for primary CNS vasculitis, or for individuals with systemic vasculitis and suspected CNS involvement include the following:
  - MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR**
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR**
  - CTA Head (CPT® 70496) **AND/OR**
  - CTA Neck (CPT® 70498) **OR**
  - CTA Head and Neck (CPT® 70471) if performed during the same session.
- If MRI findings are suggestive of vasculitis, the following is considered medically necessary:
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR**
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR**
  - CTA Head (CPT® 70496) **AND/OR**
  - CTA Neck (CPT® 70498) **OR**
  - CTA Head and Neck (CPT® 70471) if performed during the same session.
- The following are considered medically necessary for treatment response and/or surveillance imaging as ordered by a neurologist, rheumatologist, or neurosurgeon, or in consultation with one of these providers:
  - MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) **AND/OR**
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) **OR**
  - CTA Head (CPT® 70496) **AND/OR**
  - CTA Neck (CPT® 70498) **OR**
  - CTA Head and Neck (CPT® 70471) if performed during the same session.

Background and Supporting Information

- A normal MRI Brain almost always completely excludes intracranial vasculitis.

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COVID-19 and Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDHD-12.7)

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Criteria

- If concern for CNS infection, see **CNS Infection (PEDHD-29.1)**.
- For cardiac imaging, see **Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDCD-12)**

  in the Pediatric Cardiac Imaging Guidelines.
- Symptoms of MIS-C may include some or all of the following:
  - Headache **AND/OR** irritability
  - Mucocutaneous changes similar to Kawasaki disease (i.e., strawberry tongue, red cracked lips, rash of hands and/or feet)
  - Polymorphus **AND/OR** vasculitic rash
  - Non-exudative conjunctivitis
  - Tachycardia **AND/OR** hypotension
  - Cough **AND/OR** shortness of breath
  - Abdominal pain, vomiting, **AND/OR** diarrhea
  - Lymphadenopathy, joint pain, **AND/OR** sore throat

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Indication	Medically Necessary Imaging Study
◦ Imaging for neurological signs and/or symptoms, including headache, after known or presumed COVID-19 infection	◦ MRI Brain without contrast (CPT® 70551) **OR** ◦ MRI Brain without and with contrast (CPT® 70553) **AND/OR** ◦ MRA Head (CPT® 70544, CPT® 70545, **OR** CPT® 70546) **OR** ◦ CTA Head (CPT® 70496) **AND/OR** ◦ MRA Neck (CPT® 70547, CPT® 70548, **OR** CPT® 70549) **OR** ◦ CTA Neck (CPT® 70498) **OR** ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session.

Background and Supporting Information

- COVID-19 infections in children are generally mild in comparison to that of adults. However a post-viral syndrome in children has become increasingly noted.
- Multisystem Inflammatory Syndrome in Children (MIS-C) can cause an inflammatory vasculopathy, prothrombotic state, and/or post-viral myocarditis in children who have had a COVID-19 infection caused by SARS-CoV-2. The child may have had minor symptoms or been asymptomatic at the time of COVID-19 infection, but the virus can trigger endothelial injury and activation of the IL-1 pathway similar to that in Kawasaki disease and acute rheumatic fever.

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Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations (PEDHD-12.8)

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- See **Multisystemic Smooth Muscle Syndrome (MSMS)/Smooth Muscle Dysfunction Syndrome (SMDS)/ACTA2 Mutations (HD-21.7)** in the Head Imaging Guidelines.

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Benign Brain Lesions (PEDHD-13)

Guideline

Arachnoid Cysts (PEDHD-13.1)
Pineal/Colloid Cysts (PEDHD-13.2)
Acoustic Neuromas (PEDHD-13.3)

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Arachnoid Cysts (PEDHD-13.1)

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- See **Arachnoid Cysts (HD-35.1)** in the Head Imaging Guidelines.

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Pineal/Colloid Cysts (PEDHD-13.2)

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- See **Pineal/Colloid Cysts (HD-34.1)** in the Head Imaging Guidelines.

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Acoustic Neuromas (PEDHD-13.3)

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- See **Neurofibromatosis 2 (PEDPND-2.2)** in the Pediatric Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines.

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Pediatric Demyelinating Diseases (PEDHD-14)

Guideline

Pediatric Demyelinating Disease General Considerations (PEDHD-14.1)
Multiple Sclerosis (MS) (PEDHD-14.2)
Acute Disseminated Encephalomyelitis (ADEM) and Other Pediatric Demyelinating Disorders (PEDHD-14.3)
Transverse Myelitis (PEDHD-14.4)
References (PEDHD-14)

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Pediatric Demyelinating Disease General Considerations (PEDHD-14.1)

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Criteria

- For evaluation of pediatric demyelinating disease, the following imaging is considered medically necessary:
  - MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR**
  - MRI Thoracic Spine without and with contrast (CPT® 72157)
- MRI Lumbar Spine without and with contrast (CPT® 72158) is considered not medically necessary unless the individual has a tethered cord or other anatomic abnormality causing caudal displacement of the filum terminalis.
- CT imaging is generally **NOT** considered medically necessary in the evaluation of demyelinating disease.
- Metabolic (FDG) PET Brain (CPT® 78608) and MR Spectroscopy (CPT® 76390) are considered not medically necessary for evaluation of pediatric demyelinating diseases.
- For metabolic or genetic white matter disorders, including leukodystrophies and mitochondrial disorders, see **Neurometabolic and Neurogenetic Disorders (PEDHD-19.4)**.

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Multiple Sclerosis (MS) (PEDHD-14.2)

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Criteria

Indication	Medically Necessary Imaging Study
Initial diagnosis in individuals with clinical signs and/or symptoms suggestive of MS	• MRI Brain without and with contrast (CPT® 70553) **AND/OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) If there is a contraindication to gadolinium administration, then • MRI Brain without contrast (CPT® 70551) **AND/OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146)

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Indication	Medically Necessary Imaging Study
Disease monitoring whether or not receiving treatment	Every 6 months or for new signs/ symptoms: • MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553) Every 12 months or for new signs/ symptoms: • MRI Cervical Spine without and with contrast (CPT® 72156) **OR** • MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **OR** • MRI Thoracic Spine without contrast (CPT® 72146)
Optic neuritis suspected	• MRI Orbits/Face/Neck without and with contrast (CPT® 70543) may be added If there is a contraindication to gadolinium administration, then • MRI Orbits/Face/Neck without contrast (CPT® 70540) may be added
Symptoms suggestive of Progressive multifocal leukoencephalopathy (PML) during natalizumab (Tysabri®) therapy (or other medications with similar risk)	• MRI Brain without and with contrast (CPT® 70553) If there is a contraindication to gadolinium administration, then ◦ MRI Brain without contrast (CPT® 70551)

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Indication	Medically Necessary Imaging Study
Screening for individuals on natalizumab (Tysabri®) or other drugs with risk of progressive multifocal leukoencephalopathy (PML)	Every 6 months while on treatment: • MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) Every 3-6 months for high-risk individuals positive for serum JC virus antibody and >18 months natalizumab exposure: • MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551)
If MRI Brain without contrast (CPT® 70551) shows incidental evidence of possible demyelinating disease	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain with contrast (CPT® 70552)
After an MRI Brain without contrast (CPT® 70551), a follow-up MRI brain may be performed at the discretion of a neurologist, a neurosurgeon, or a neuro-ophthalmologist, or any provider in consultation with a neurologist, neurosurgeon, or neuro-ophthalmologist, and/or at the recommendation of the radiologist	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain with contrast (CPT® 70552)

Background and Supporting Information

- Multiple sclerosis is less common in children. About 4% of MS cases are diagnosed before age 18, and only ~0.7% of all MS cases begin before age of 10 years.
- Common presentations of MS in children include ataxia, optic neuritis, diplopia, transverse myelitis or as an acute encephalitis-like illness.
- Among children with suspected demyelinating diseases, the principal differential diagnosis is often between MS, Acute Disseminated Encephalomyelitis (See **Acute Disseminated Encephalomyelitis (ADEM) and Other Pediatric Demyelinating Disorders (PEDHD-14.3)** or MOG Antibody-Associated Disease (MOGAD). (See **MOG Antibody-Associated Disease (MOGAD) (HD-16.3)**).
- Medications with similar risks of Progressive Multifocal Leukoencephalopathy (PML) as Tysabri® include: dimethyl fumarate (Tecfidera®), fingolimod (Gilenya®),

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ocrelizumab (Ocrevus®), clardribine (Mavenclad®), diroximel fumarate (Vumerity®), eculizaumab (Soliris®), ozanimod (Zeposia®), alemtuzumab (Lemtrada®), monomethyl fumarate (Bafiertam®), rituximab (Rituxan®).

- If a non-contrast study shows incidental evidence of possible demyelinating disease, repeat imaging is appropriate as the presence of enhancing lesions may be helpful in confirming the diagnosis.
- 3D imaging in the evaluation of Multiple Sclerosis is not supported as a separate code. Most scanners are capable of 3D acquisitions or other imaging sequences.

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Acute Disseminated Encephalomyelitis (ADEM) and Other Pediatric Demyelinating Disorders (PEDHD-14.3)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) **AND/OR** MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** MRI Thoracic Spine without and with contrast (CPT® 72157) are considered medically necessary as the initial imaging in individuals with clinical signs and/or symptoms suggestive of ADEM OR for follow-up imaging when ordered by a neurologist or any provider in consultation with a neurologist.
  - MRI Brain without contrast (CPT® 70551) **AND/OR** MRI Cervical Spine without contrast (CPT® 72141) **AND/OR** MRI Thoracic Spine without contrast (CPT® 72146) are considered medically necessary if there is a contraindication to gadolinium.
- Other pediatric demyelinating disorders that have clinical overlap with multiple sclerosis and ADEM include, but are not limited to:
  - **Neuromyelitis Optica Spectrum Disorders (HD-16.2)**
  - **Anti-MOG Syndromes (HD-16.3)**
  - **Traverse myelitis (HD-16.4)**
- For metabolic or genetic white matter disorders, including leukodystrophies and mitochondrial disorders, see **Neurometabolic and Neurogenetic Disorders (PEDHD-19.4)**.

Background and Supporting Information

- ADEM has an acute onset, and is more common among younger children than MS, but the signs and symptoms overlap significantly and distinguishing between MS and ADEM can be challenging based on clinical examination alone.
- Most individuals will have complete clinical recovery by 12 months, while stable MRI abnormalities (gliosis) may persist. These findings do not require additional imaging unless the individual develops new neurologic symptoms. Prolonged symptoms or return of symptoms may represent a different demyelinating disorder.

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Transverse Myelitis (PEDHD-14.4)

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- See **Transverse Myelitis (HD-16.4)** in the Head Imaging Guidelines.

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Pituitary Dysfunction (PEDHD-15)

Guideline

Pituitary Dysfunction General Considerations (PEDHD-15.1)
Panhypopituitarism (PEDHD-15.2)
Isolated Growth Hormone Deficiency (PEDHD-15.3)
Diabetes Insipidus (DI) and Other Disorders of Anti-Diuretic Hormone (PEDHD-15.4)
Precocious Puberty (PEDHD-15.5)
Benign Pituitary Tumors (PEDHD-15.6)
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Pituitary Dysfunction General Considerations (PEDHD-15.1)

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Criteria

- The initial step in the evaluation of all potential pituitary masses is a detailed history, recent physical examination, and thorough neurological exam, including evaluation of the visual fields.
- Endocrine laboratory studies should be performed prior to considering initial advanced imaging.
- MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) when pituitary imaging is considered medically necessary.
  - Pituitary Gland: one study (either MRI Brain without and with contrast [CPT® 70553] **OR** MRI Orbits/Face/Neck [CPT® 70543]) is adequate to report the imaging of the pituitary. The reporting of two CPT® codes to image the pituitary is considered not medically necessary.
- If a previous MRI Brain was reported to show a possible pituitary tumor with supporting evidence of pituitary disease or is inconclusive, a repeat MRI with dedicated pituitary protocol may be performed. If a prior MRI Brain was without contrast, a follow-up scan either MRI Brain with contrast (CPT® 70552) **OR** MRI Brain without and with contrast (CPT® 70553) is appropriate.
- For association between pituitary dysfunction and optic nerve issues, see **Eye Disorders and Visual Loss (HD- 32.1)** in the Head Imaging Guidelines.
- For repeat imaging, see **Pituitary, Sella, Hypothalamus (HD-19.1)** in the Head Imaging Guidelines.

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Panhypopituitarism (PEDHD-15.2)

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Criteria

- Endocrine testing should be performed initially.
- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) with special attention to the pituitary is considered medically necessary for newly diagnosed panhypopituitarism.
- Individuals with a normal pituitary on initial MRI do not need routine follow-up imaging.
- Individuals with mass lesions should have follow-up imaging according to the guidelines for the specific diagnosis.

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Isolated Growth Hormone Deficiency (PEDHD-15.3)

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Criteria

- Clinical features include: height below the normal range (<3rd percentile), subnormal growth velocity, or the child's height is below the range expected based on parental height.
- Risk factors include: a history of brain tumor, cranial irradiation, or other congenital/ organic hypothalamic-pituitary abnormality as well as an incidental finding of a hypothalamic-pituitary abnormality on MRI.
- Endocrine testing should be performed initially.
- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) with special attention to the pituitary is considered medically necessary for any of the following:
  - Both IGF1 and IGFBP3 are below the laboratory reference range for age/sex or Tanner stage.
  - 2 measurements of growth hormone stimulation with different stimulation agents (glucagon, clonidine, arginine, insulin, levodopa) performed on the same day or separate days produce maximal GH levels <10ng/mL. See **Background and Supporting Information.**
- Individuals with a normal pituitary on initial MRI do not need routine follow-up imaging.
- Individuals with mass lesions should have follow-up imaging according to the guidelines for the specific diagnosis.

Background and Supporting Information

- Growth hormone stimulation testing is limited by poor specificity and requires failure on 2 tests to diagnose growth hormone deficiency.
- Controversy exists as to the cutoff level which differentiates a normal response from a deficient response on provocative testing. Some experts support GH <7ng/mL however many pediatric endocrinologists consider a peak GH level <10ng/mL to be indicative of growth hormone deficiency and may identify children with partial GHD.

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Diabetes Insipidus (DI) and Other Disorders of Anti-Diuretic Hormone (PEDHD-15.4)

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Criteria

- Laboratory testing should be performed initially. Diabetes insipidus is characterized by serum osmolality greater than 300mOsm/kg and urine osmolality under 300mOsm/kg.
- Central diabetes insipidus (CDI) is caused by diminished synthesis or secretion of vasopressin in the hypothalamus and nephrogenic diabetes insipidus (NDI) is caused by renal resistance to vasopressin.

Central Diabetes Insipidus (DI)

- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for newly diagnosed central DI.
- Individuals with a normal pituitary on initial MRI can have repeat MRI Brain without and with contrast (CPT® 70553) every 3-6 months for the first 2 years as germinomas may cause central DI while still too small to detect on imaging.
  - Serial measurement of β -hCG is also considered medically necessary for these individuals, and MRI should be repeated if a significant rise in β -hCG is detected on screening.
- Individuals with mass lesions should have follow-up imaging according to the guidelines for the specific diagnosis.

Nephrogenic DI

- Once this diagnosis is firmly established, further advanced imaging is usually considered not medically necessary.

Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

- Laboratory studies should be obtained prior to considering advanced imaging—urine osmolality should be high and serum osmolality low.
- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for initial evaluation of unexplained central (hypothalamic pituitary) SIADH.
- Individuals with a normal pituitary on initial MRI do not need routine follow-up imaging.

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- Individuals with mass lesions should have follow-up imaging according to the guidelines for the specific diagnosis.

Background and Supporting Information

- See **Small Cell Lung Cancer-Suspected/Diagnosis (ONC-7.1)** and **Paraneoplastic Syndromes (ONC-30.3)** in the Oncology Imaging Guidelines.
- Pulmonary diseases including infection (tuberculosis, viral/bacterial pneumonia), acute respiratory infections, mechanical ventilation and others can cause SIADH although the mechanism is unclear. Individuals with lung disease should have chest imaging according to the guidelines for the specific diagnosis.

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Precocious Puberty (PEDHD-15.5)

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Criteria

- Defined as the appearance of secondary sexual characteristics before age 8 in females and before age 9 in males. The diagnosis is made clinically using Tanner staging and often will include a bone age assessment (hand/wrist radiographs) and/or abdominal and/or pelvic ultrasound (See Peripheral Precocious Puberty below).
- Endocrine laboratory studies (baseline LH, FSH and either estradiol or testosterone) are used to determine if the etiology of precocious puberty is central (gonadotropin dependent) or peripheral (gonadotropin independent). Estradiol and testosterone levels will often be elevated to a pubertal range.

Central Precocious Puberty (CPP)

- An LH greater than 0.3U/L on a random blood sample is the most reliable screening test for central precocious puberty. If LH is under 0.3U/L and CPP is suspected, a stimulation test with a GnRH analog is the gold standard.
- Neuroimaging should always follow hormonal studies that suggest a central origin of precocious puberty.
- MRI Brain without and with contrast (CPT® 70553, preferred study) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for evaluation of any child with documented central precocious puberty.
- MRI is appropriate irrespective of age and gender in individuals with precocious puberty and concurrent CNS symptoms of severe headache, visual changes, or seizures.
- Individuals with a normal pituitary on initial MRI do not need routine follow-up imaging.
- Individuals with mass lesions should have follow-up imaging according to the guidelines for the specific diagnosis. (**Benign Pituitary Tumors (PEDHD-15.6**) and **Pituitary Malignancies (PEDHD-15.7)**)

Peripheral Precocious Puberty

- The differential diagnosis of peripheral precocious puberty (LH suppressed or in the pre-pubertal range with elevated estradiol, testosterone, and/or adrenal androgens) is broad and may include ovarian, testicular, adrenal, and other sources of excessive hormonal production.
- Ultrasound Abdomen (CPT® 76700) in both genders and Ultrasound Pelvis (CPT® 76856) in females and Scrotal ultrasound (CPT 76870) in males depending on the suspected source of hormonal excess for initial imaging.

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- See **CNS Germinomas and Non-Germinomatous Germ Cell Tumors (PEDONC-4.7)** in the Pediatric and Special Populations Oncology Imaging Guidelines for evaluation of HCG secreting CNS tumors.
- See **Hepatoblastoma (PEDONC-11.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines for evaluation of HCG secreting hepatic tumors.
- See **Pediatric Germ Cell Tumors (PEDONC-10)** in the Pediatric and Special Populations Oncology Imaging Guidelines and **Testicular, Ovarian and Extragonadal Germ Cell Tumors (ONC-20)** in the Oncology Imaging Guidelines for evaluation of Leydig Cell tumors.
- See **Adrenal Cortical Lesions (AB-16.1)** in the Abdomen Imaging Guidelines for evaluation of adrenal virilizing tumors.

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Benign Pituitary Tumors (PEDHD-15.6)

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- Benign pituitary tumor indications in pediatric individuals are identical to those for adult individuals. See **Pituitary, Sella, Hypothalamus (HD-19)** in the Head Imaging Guidelines.

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Pituitary Malignancies (PEDHD-15.7)

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- See **Craniopharyngioma and Other Hypothalamic/Pituitary Region Tumors (PEDONC-4.10)** or **Histiocytic Disorders (PEDONC-18)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Pediatric Ear Disorders (PEDHD-16)

Guideline

Hearing Loss (PEDHD-16.1)
Ear Pain (PEDHD-16.2)
Cholesteatoma (PEDHD-16.3)
Vertigo (PEDHD-16.4)
Tinnitus (PEDHD-16.5)
References (PEDHD-16)

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Hearing Loss (PEDHD-16.1)

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Criteria

- A pertinent evaluation including a detailed history, physical examination (including otoscopic examination), and age-appropriate audiology testing should be performed on any child with known or suspected hearing loss prior to considering advanced imaging. The selection of imaging testing will depend on the age of the child and type of hearing loss.
- CT Orbits/Temporal Bone without contrast (CPT® 70480) is considered medically necessary for the following:
  - Conductive hearing loss of any cause
  - Pre-operative planning for resection of mass lesion or cochlear implant placement
  - Sensorineural hearing loss in individuals who cannot safely undergo MRI
  - Mixed conductive and sensorineural hearing loss
  - Congenital hearing loss
  - Total deafness
- MRI Brain without and with contrast (CPT® 70553) with attention to internal auditory canals (included in CPT® 70553 and does not require a separate CPT® code) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for the following:
  - Conductive hearing loss secondary to known or suspected mass lesion
  - Pre-operative planning for resection of mass lesion or cochlear implant placement
  - Sensorineural hearing loss of any cause
  - Mixed conductive and sensorineural hearing loss
  - Congenital hearing loss
  - Total deafness
  - For hearing loss associated with tinnitus, see **Tinnitus (PEDHD-16.5)**.
- Both modalities (CT and MRI) are supported simultaneously for evaluation and surgical planning if ordered by or in consultation with an ENT or neurosurgical specialist.
- Limited MRI Brain with attention to internal auditory canals (CPT® 70540, CPT® 70542, or CPT® 70543) is considered medically necessary when requested by the provider in place of a complete MRI Brain. Note: Limited MRI codes should not be used in addition to MRI Brain codes; IAC views are performed as additional sequences as part of the brain study. (See **General Guidelines – Anatomic Issues (HD-1.1)** in the Head Imaging Guidelines)

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Ear Pain (PEDHD-16.2)

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Criteria

- A pertinent evaluation including a detailed history, physical examination (including otoscopic examination), should be performed on any child with ear pain prior to considering advanced imaging. Common causes of ear pain include external and middle ear infections, dental problems, sinus infection, neck problems, and referred pain from the oral pharynx, tonsillitis, and pharyngitis.
- Advanced imaging is considered not medically necessary in the overwhelming majority of pediatric individuals with ear pain.

Indications	Medically Necessary Imaging Study
◦ Any of the following ▪ Persistent ear pain without obvious cause ▪ Clinical suspicion for complicated or invasive infection such as mastoiditis ▪ Clinical suspicion of mass lesion causing ear pain ▪ Significant trauma with concern for hematoma formation ▪ Pre-operative planning	◦ ONE of the following: ▪ CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR** ▪ CT Orbits/Temporal Bone without and with contrast (CPT® 70482) **OR** ▪ MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) **OR** ▪ MRI Orbits/Face/Neck without and with contrast (CPT® 70543)

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Cholesteatoma (PEDHD-16.3)

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Criteria

- ONE of the following studies is considered medically necessary for pre-operative evaluation in children with cholesteatoma:
  - CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR**
  - CT Orbits/Temporal Bone without and with contrast (CPT® 70482) **OR**
  - MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553), **OR**
  - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
- ONE of the following studies is considered medically necessary one time post-operatively to exclude residual or regrown cholesteatoma to avoid the need for a second-look surgery:
  - CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR**
  - CT Orbits/Temporal Bone without and with contrast (CPT® 70482) **OR**
  - MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) **OR**
  - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)

Background and Supporting Information

- Cholesteatomas are expansive cysts of the middle ear filled with cellular debris. They can be congenital or arise from recurrent middle ear infections or trauma to the tympanic membrane. Hearing loss is usually conductive, although if the lesion is large enough combined conductive and sensorineural hearing loss may be present. Otoscopic exam findings and symptoms may include a white mass in the middle ear cleft, painless drainage from the ear or chronic/recurrent ear infections. Advanced imaging for the diagnosis and management of suspected cholestatoma, in particular, should be reserved for the otolaryngologist or provider in consultation with the otolaryngologist.

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Vertigo (PEDHD-16.4)

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Criteria

- A pertinent evaluation including a detailed history, physical examination (including otoscopic examination), should be performed on any child with vertigo prior to considering advanced imaging.
- If physical examination is otherwise normal and the vertigo responds to treatment, advanced imaging is considered not medically necessary.
- MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) is medically necessary for the following:
  - Vertigo with associated headache or ataxia
  - Vertigo associated with tinnitus
  - Vertigo that does not respond to vestibular treatment

Background and Supporting Information

Isolated vertigo is an uncommon complaint during childhood. Middle ear/Eustachian tube problems are the most common cause of isolated vertigo in children.

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Tinnitus (PEDHD-16.5)

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Criteria

- Tinnitus without hearing loss is a less common complaint during childhood.
- Children with hearing loss and tinnitus should be imaged according to **Hearing Loss (PEDHD-16.1)**. A pertinent evaluation including a detailed history, physical examination (including otoscopic examination), and age-appropriate audiology testing should be performed on any child with known or suspected tinnitus prior to considering advanced imaging.
- Advanced imaging is considered not medically necessary in the overwhelming majority of pediatric individuals with isolated tinnitus and normal hearing.

Indications	Medically Necessary Imaging Study
• ANY of the following ◦ Clinical suspicion of mass lesion causing tinnitus ◦ Persistent tinnitus after recent significant trauma	• ONE of the following ◦ CT Orbits/Temporal Bone without contrast (CPT® 70480) **OR** ◦ CT Orbits/Temporal Bone without and with contrast (CPT® 70482), **OR** ◦ MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) **OR** ◦ MRI Brain without contrast with attention to internal auditory canals (CPT® 70553) **OR** ◦ MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
• ANY of the following: ◦ Pulsatile tinnitus ◦ Suspicion for vascular lesions	• MRA Head (CPT® 70544, CPT® 70545 **OR** CPT® 70546) **OR** • CTA Head (CPT® 70496) **AND/OR** • MRA Neck (CPT® 70547, CPT® 70548 **OR** CPT® 70549) **OR** • CTA Neck (CPT® 70498) ◦ CTA Head and Neck (CPT® 70471) must be substituted if performed during the same session.

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Autism Spectrum Disorders (PEDHD-17)

Guideline

Autism Spectrum Disorders (PEDHD-17.1)
References (PEDHD-17)

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Autism Spectrum Disorders (PEDHD-17.1)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for:
  - new or worsening focal neurologic findings documented on a pertinent physical **AND/OR**
  - loss of developmental milestones and/or regression in two or more areas of development.
- PET imaging is considered considered not medically necessary in the evaluation of individuals with autism spectrum disorders.

Background and Supporting Information

- The group of diagnoses are classified as pervasive development disorders (PDD). These diagnoses are established on clinical criteria, and no imaging study can confirm the diagnosis.
- Comprehensive evaluation for autism might include history, physical exam, audiology evaluation, speech, language, and communication assessment, cognitive and behavioral assessments, and academic assessment.

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Behavioral and Psychiatric Disorders (PEDHD-18)

Guideline

Behavioral and Psychiatric Disorders (PEDHD-18.1)
Reference (PEDHD-18)

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Behavioral and Psychiatric Disorders (PEDHD-18.1)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) **OR** CT Head without contrast (CPT® 70450) is considered medically necessary for:
  - acute onset mental status change
  - new or worsening focal neurologic findings
  - presentation of acute psychiatric symptoms with comorbid serious medical illness
  - non-auditory hallucinations (e.g., visual, tactile, olfactory) with no known etiology
  - non-response to adequate medication trials
  - symptoms of an organic brain disorder (e.g., focal deficits, severe headache, or seizures)
- For concerns of PANS (Pediatric acute-onset neuropsychiatric syndrome) and PANDAS (Pediatric autoimmune neuropsychiatric disorder associated with streptococcal infection), see **Movement Disorders including Tourette Syndrome (PEDHD-26)**.

Background and Supporting Information

- Routine brain imaging is not routinely recommended for obsessive compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD), and autism spectrum disorder (ASD).

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Reference (PEDHD-18)

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Developmental Disorders (PEDHD-19)

Guideline

Intellectual Disability (PEDHD-19.1)
Cerebral Palsy (PEDHD-19.2)
Developmental Motor Delay (PEDHD-19.3)
Neurometabolic and Neurogenetic Disorders (PEDHD-19.4)
References (PEDHD-19)

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Intellectual Disability (PEDHD-19.1)

HDP.ID.0019.1.A
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Criteria

- Intellectual disability may be primary or secondary to a variety of heterogeneous disorders.
- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for new or worsening focal neurologic findings and/or new or worsening cognitive decline.

Background and Supporting Information

- Intellectual disability is a condition characterized by significant limitations in both intellectual functioning and adaptive behavior that originates before the age of 22. One way to measure intellectual functioning is an IQ test. Generally, an IQ test score of around 70 or as high as 75 indicates a significant limitation in intellectual functioning (American Association on Intellectual and Developmental Disabilities, 2019).

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Cerebral Palsy (PEDHD-19.2)

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Criteria

- MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) is considered medically necessary for:
  - initial evaluation of newly diagnosed cerebral palsy
  - new or worsening focal neurologic findings documented on a physical examination, including the presence of developmental delay
  - re-evaluation after 24 months of age due to rapid myelination during the first 2 years of life
- For spinal imaging requests, see **Myelopathy (SP-7.1)** in the Spine Imaging Guidelines.

Background and Supporting Information

- Many individuals with intellectual disability also have cerebral palsy, but not all individuals with cerebral palsy have intellectual disability.
- Cerebral palsy is a static motor encephalopathy caused by a variety of entities spanning developmental, metabolic, genetic, infectious, ischemic, and other acquired etiologies.

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Developmental Motor Delay (PEDHD-19.3)

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Criteria

- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary for:
  - initial evaluation of newly diagnosed developmental motor delay with abnormal muscle tone
  - toe walking, when associated with upper motor neuron signs including hyperreflexia, abnormal tone (spasticity/hypotonia), or positive Babinski sign
  - new or worsening focal neurologic findings
  - repeat brain imaging one time after 24 months of age due to rapid myelination during the first 2 years of life
- For spinal imaging requests, see **Myelopathy (SP-7.1)** in the Spine Imaging Guidelines and **Spinal Dysraphism and Tethered Spinal Cord (PEDSP-4)** in the Pediatric and Special Populations Spine Imaging Guidelines.

Background and Supporting information

- There are many causes for developmental motor delay. Individuals with motor delay can have decreased, normal, or increased muscular tone. Individuals with normal tone do not require imaging unless they have focal neurologic findings.

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Neurometabolic and Neurogenetic Disorders (PEDHD-19.4)

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Criteria

Medically Necessary Imaging Study	Indications	Suspected or Known Neurometabolic and/or Neurogenetic Disorders Including, but not limited to
MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) **AND/OR** Magnetic Resonance Spectroscopy (MRS, CPT® 76390)	Requested by a neurologist or geneticist, or any provider in consultation with a neurologist or geneticist, for: • Initial evaluation **AND/OR** • Disease monitoring **AND/OR** • New or worsening symptoms **AND/OR** • Change in therapy is being considered	• X-linked adrenoleukodystrophy (X-ALD, CALD) • Alexander disease (ALX, AXD, dysmyelinogenic leukodystrophy) • Canavan disease • Creatine deficiency • Globoid cell leukodystrophy (Krabbe disease) • Hypomyelination and congenital cataract • Maple syrup urine disease • Megalencephalic leukoencephalopathy with subcortical cysts

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Medically Necessary Imaging Study	Indications	Suspected or Known Neurometabolic and/or Neurogenetic Disorders Including, but not limited to
MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551) **AND/OR** Magnetic Resonance Spectroscopy (MRS, CPT® 76390)	Requested by a neurologist or geneticist, or any provider in consultation with a neurologist or geneticist, for: • Initial evaluation **AND/OR** • Disease monitoring **AND/OR** • New or worsening symptoms **AND/OR** • Change in therapy is being considered	• Metachromatic leukodystrophy (MCL) • Mitochondrial disorders (such as, but not limited to, Leigh's syndrome, Kearns-Sayre syndrome, Mitochondrial encephalopathy with lactic acidosis and stroke-like episodes (MELAS)) • Nonketotic hyperglycinemia • Pelizaeus-Merzbacher disease (PMD) • Vanishing white matter (VWM) disease (Leukoencephalopathy with VWM, childhood ataxia with CNS hypomyelination (CACH) syndrome)

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Ataxia (PEDHD-20)

Guideline

Ataxia (PEDHD-20.1)
References (PEDHD-20)

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Ataxia (PEDHD-20.1)

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Criteria

- See also **Developmental Disorders (PEDHD-19)**.
- A pertinent evaluation, including a detailed history and physical examination with a thorough neurologic examination, should be performed prior to considering advanced imaging, unless the individual is undergoing guideline-supported scheduled follow-up imaging evaluation or request is from or in consultation with a neurologist or neurosurgeon who has seen the individual since onset of symptoms.

Indications	Medically Necessary Imaging Study
• ANY of the following: ◦ Ataxia ◦ Hereditary ataxia ◦ Slowly progressive ataxia	• MRI Brain without and with contrast (CPT® 70553) **OR** • MRI Brain without contrast (CPT® 70551) **OR** • CT Head without contrast (CPT® 70450) *If the initial CT or MRI study is unable to answer the clinical question at hand, an exam of the other modality is considered medically necessary if needed to direct clinical management.*
• Suspected spinal etiology	• MRI Cervical Spine without contrast (CPT® 72141) **OR** • MRI Cervical Spine without and with contrast (CPT® 72156) **AND/OR** • MRI Thoracic Spine without contrast (CPT® 72146) **OR** • MRI Thoracic Spine without and with contrast (CPT® 72157) **AND/OR** • MRI Lumbar Spine without contrast (CPT® 72148) **OR** • MRI Lumbar Spine without and with contrast (CPT® 72158)

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Indications	Medically Necessary Imaging Study
• Acute ataxia following significant head trauma	• CT Head without contrast (CPT® 70450) **OR** • CT Head without and with contrast (CPT® 70470) **OR** • MRI Brain without contrast (CPT® 70551) **OR** • MRI Brain without and with contrast (CPT® 70553)
• Contraindication to MRI	• CT Head without and with contrast (CPT® 70470) **OR** • CT Head with contrast (CPT® 70460
• BOTH of the following: ◦ Contraindication to MRI ◦ Suspected spinal etiology	• CT Cervical Spine without contrast (CPT® 72125) **OR** • CT Cervical Spine without and with contrast (CPT® 72127) **AND/OR** • CT Thoracic Spine without contrast (CPT® 72128) **OR** • CT Thoracic Spine without and with contrast (CPT® 72130) **AND/OR** • CT Lumbar Spine without contrast (CPT® 72131) **OR** • CT Lumbar Spine without and with contrast (CPT® 72133)

- Repeat imaging is considered medically necessary when ordered by a neurologist or neurosurgeon, or any provider in consultation with one of these providers, or if there are new signs or symptoms.

Background and Supporting Information

- Ataxia refers to an abnormally ill-coordinated or unsteady gait for age. "Limb ataxia" refers to impaired coordination (for age) of limbs, especially arms. Developmental failure to acquire the ability to walk is a form of developmental delay, not ataxia.
- CT should not be used in place of MRI solely to avoid sedation in young children because MRI is superior for imaging the posterior fossa.

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Epistaxis (PEDHD-21)

Guideline

Epistaxis Imaging (PEDHD-21.1)
References (PEDHD-21)

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Epistaxis Imaging (PEDHD-21.1)

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Criteria

- Initial evaluation of epistaxis (nosebleed), including recurrent epistaxis that is refractory to medical management is by direct or endoscopic visualization of the relevant portions of the upper airway.
- If a mass lesion is detected on direct visualization, the following imaging studies are considered medically necessary:
  - CT Maxillofacial without contrast (CPT® 70486) **OR** CT Maxillofacial without and with contrast (CPT® 70488) **AND/OR**
  - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)

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Papilledema/Pseudotumor Cerebri (PEDHD-22)

Guideline

Papilledema/Pseudotumor Cerebri (PEDHD-22.1)

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Papilledema/Pseudotumor Cerebri (PEDHD-22.1)

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- Papilledema/Pseudotumor cerebri indications in pediatric individuals are identical to those for adult individuals. See **Papilledema/Pseudotumor Cerebri (HD-17.1)** in the Head Imaging Guidelines.

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Cranial Neuropathies (PEDHD-23)

Guideline

Cranial Neuropathies (PEDHD-23.1)

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Cranial Neuropathies (PEDHD-23.1)

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- See **Cranial Neuropathies (HD-31.1)** in the Head Imaging Guidelines.

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Pediatric Sleep Disorders (PEDHD-24)

Guideline

Pediatric Sleep Disorders (PEDHD-24.1)
References (PEDHD-24)

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Pediatric Sleep Disorders (PEDHD-24.1)

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Criteria

- See **Pediatric Sleep Guidelines (SL-3)** in the Sleep Apnea and Treatment Clinical Guidelines.
- For over 18 years of age OR regarding oral appliance OR hypersomnolence, see **Sleep-Related Imaging Guidelines (HD-37)** in the Head Imaging Guidelines.
- For Obstructive Sleep Apnea:
  - Imaging prior to tonsillectomy (with or without adenoidectomy) for obstructive sleep apnea is considered not medically necessary.
  - Initially, endoscopic examination of the upper airway should be performed.
    - CT Maxillofacial without contrast (CPT® 70486) is considered medically necessary for evaluation of obstructive anatomy if operative intervention, other than a tonsillectomy (with or without adenoidectomy), is being considered.
- For suspected central sleep apnea, the following is considered medically necessary:
  - MRI Brain without contrast (CPT® 70551) OR
  - MRI Brain without and with contrast (CPT® 70553)
- Advanced imaging is NOT considered medically necessary for the following:
  - Confusional arousals
  - Sleep terrors
  - Nightmare disorder
  - Sleepwalking (somnambulism)
  - Bed wetting (enuresis)
  - Insomnia
  - Narcolepsy (without or with cataplexy)
  - Restless leg syndrome/periodic limb movement disorder
- For suspected sleep-related seizure imaging, see **Epilepsy and Other Seizure Disorders (PEDHD-6)**.

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Temporomandibular Joint (TMJ)/Dental/ Maxillofacial Imaging in Children (PEDHD-25)

Guideline

Temporomandibular Joint Imaging (PEDHD-25.1)
Dental/Periodontal/Maxillofacial Imaging (PEDHD-25.2)
References (PEDHD-25)

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Temporomandibular Joint Imaging (PEDHD-25.1)

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Criteria

- Temporomandibular Joint (TMJ) imaging indications in pediatric individuals are very similar to those for adult individuals. See **Temporomandibular Joint Disease (TMJ) (HD-30.1)** in the Head Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - There is a paucity of clinical symptoms and poor sensitivity of conventional x-rays in diagnosing TMJ arthritis in pediatric individuals with arthritis.
- MRI TMJ (CPT® 70336) is considered medically necessary annually for detecting silent TMJ arthritis in children with juvenile idiopathic arthritis (JIA) as requested by a rheumatologist and/or oral/maxillofacial surgeon (OMS) and/or any provider in consultation with a rheumatologist or OMS.
- Repeat imaging with MRI TMJ (CPT® 70336) in individuals with JIA is considered medically necessary for any of the following:
  - Change in signs or symptoms suggesting progression of disease
  - To monitor the effects of treatment
- Bone Scintigraphy/Bone Scan 3 Phase Study (CPT® 78315) in individuals over 12 years of age is considered medically necessary in anticipation or consideration of surgery.
- Unilateral condylar hyperplasia is manifested by slow growth in areas of the mandible causing facial asymmetry. It is usually a self-limiting condition seen predominantly in 12-30 year-olds.

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Dental/Periodontal/Maxillofacial Imaging (PEDHD-25.2)

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- See **Dental/Periodontal/Maxillofacial Imaging (HD 30.2)** in the Head Imaging Guidelines.

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Movement Disorders including Tourette Syndrome (PEDHD-26)

Guideline

Tourette Syndrome (PEDHD-26.1)
Movement Disorders (PEDHD-26.2)
References (PEDHD-26)

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Tourette Syndrome (PEDHD-26.1)

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Criteria

- The diagnosis of Tourette syndrome is made clinically and advanced neuroimaging is not considered medically necessary for either diagnosis or management.

Background and Supporting Information

- Tourette syndrome (TS) is a neurological disorder characterized by repetitive, stereotyped, involuntary movements and vocalizations called tics. The first symptoms of TS are almost always noticed in childhood. Some of the more common tics include eye blinking and other vision irregularities, facial grimacing, shoulder shrugging, and head or shoulder jerking. Perhaps the most dramatic and disabling tics are those that result in self-harm such as punching oneself in the face, or vocal tics including coprolalia (uttering swear words) or echolalia (repeating the words or phrases of others). Many with TS experience additional neurobehavioral problems including inattention, hyperactivity and impulsivity, and obsessive-compulsive symptoms such as intrusive thoughts/worries and repetitive behaviors(National Institute of Neurological Disorders and Stroke, 2026).

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Movement Disorders (PEDHD-26.2)

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Criteria

- MRI Brain without contrast (CPT® 70551), **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary in the following clinical scenarios:
  - Atypical clinical features for example, movements that persist in sleep, onset outside of typical age at onset (4-6 years for tics), rapid progression, incomplete or uncertain medication responsiveness, clinical diagnostic uncertainty, limbic encephalitis
  - Dystonia, intermittent involuntary muscle contractions
  - Chorea, continual irregular movements
  - Ballism, involuntary high amplitude movements
  - Athetosis, slow writhing continuous movements
  - Myoclonus, involuntary muscle jerks (not sleep myoclonus)
- MRI Brain without contrast (CPT® 70551) **OR** MRI Brain without and with contrast (CPT® 70553) is considered medically necessary only after a complete medical workup including labs, acute infection, and other comorbid psychiatric disorders (examples, such as obsessive compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD), and autism spectrum disorder (ASD) have been investigated for concerns of:
  - PANS (pediatric acute-onset neuropsychiatric syndrome) **AND/OR**
  - PANDAS (pediatric autoimmune neuropsychiatric disorder associated with streptococcal infection)
- See **Movement Disorders (HD-15.1)** in the Head Imaging Guidelines for the following:
  - Suspected Huntington's disease
  - Evaluation for surgical treatment of essential tremor or Parkinson’s disease, including deep brain stimulator (DBS) placement

Background and Supporting Information

- Movement disorders are hyperkinetic and hypokinetic movements that are involuntary. The majority are diagnosed based on a clinical diagnosis and do not require imaging.
- Typically, benign movement disorders include:
  - Stereotypies, repetitive rhythmic movements
  - Tics that are vocal or motor with typical onset and course

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  - Tourette syndrome
  - Essential tremor or tremors of anxiety or weakness
  - Restless leg syndrome
- Routine brain imaging is not routinely recommended for OCD, ADHD, or ASD.
- There is little evidence to support the use of MRA/CTA and PET in the evaluation of movement disorders.

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Tuberous Sclerosis (PEDHD-27)

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Tuberous Sclerosis (PEDHD-27.1)

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Tuberous Sclerosis (PEDHD-27.1)

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- See **Tuberous Sclerosis Complex (TSC) (PEDONC-2.9)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Von Hippel-Lindau Syndrome (VHL) (PEDHD-28)

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Von Hippel-Lindau Syndrome (VHL) (PEDHD-28.1)

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Von Hippel-Lindau Syndrome (VHL) (PEDHD-28.1)

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- See **Von Hippel-Lindau Syndrome (VHL) (PEDONC-2.10)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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CNS Infection (PEDHD-29)

Guideline

CNS Infection (PEDHD-29.1)
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CNS Infection (PEDHD-29.1)

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Criteria

- CNS infection imaging indications in pediatric individuals are similar to those for adult individuals. See **CNS and Head Infection (HD-14.1)** in the Head Imaging Guidelines.
- For COVID-19 infection, see **Neuro-COVID-19 and Sars-CoV-2 Vaccines (HD 14.2)** in the Head Imaging Guidelines.
- For Multisystem Inflammatory Syndrome in Children (MIS-C), see **COVID-19 and Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDHD-12.7)**.
- For autoimmune/paraneoplastic encephalitis, see **Autoimmune/Paraneoplastic Encephalitis & Neuroinflammatory Disorders (HD-14.3)** in the Head Imaging Guidelines.
- For pediatric-specific imaging considerations, including suspected congenital brain infection and neonatal meningitis, the following is considered medically necessary:
  - Ultrasound Head (CPT© 76506) **AND/OR**
  - CT Head without contrast (CPT® 70450) **OR** CT Head without and with contrast (CPT® 70470)

    AND/OR
  - MRI Brain without and with contrast (CPT® 70553) **OR** MRI Brain without contrast (CPT® 70551)
- Newborn infants with microcephaly should be evaluated as discussed in **Macrocephaly, Microcephaly, and Hydrocephalus (PEDHD-7).**

Background and Supporting Information

- Neonatal meningitis most often is caused by bacterial pathogens and usually occurs as a complication of sepsis in the first week of life. In older infants and children, meningeal inoculation occurs secondary to hematogenous spread or penetrating trauma.
- The common causes of prenatal infections of the central nervous system are cytomegalovirus, *Toxoplasma gondii*, herpes simplex type 2 virus, and most recently, zika virus. The findings suggesting prenatal brain infection include microcephaly, microphthalmia, chorioretinitis, cataracts, hypotonia, and seizures.

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Scalp and Skull Lesions (PEDHD-30)

Guideline

Scalp and Skull Lesions (PEDHD-30.1)
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Scalp and Skull Lesions (PEDHD-30.1)

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Criteria

- Scalp and skull lesion imaging indications (including Pott Puffy Tumor) in pediatric individuals are identical to those for adult individuals with the exception of neonates. See **Scalp and Skull Lesions (HD-20.1)** in the Head Imaging Guidelines.
- For neonates with palpable scalp and skull lesions, the following is considered medically necessary:
  - Ultrasound Head (CPT® 76506) **AND/OR**
  - MRI Brain without and with contrast (CPT® 70553) **AND/OR**
  - CT Head without and with contrast (CPT® 70470)

Background and Supporting Information

- In neonates and young infants, scalp masses include the following:
  - Congenital lesions (cephalocele, dermoid cyst, epidermoid cyst)
  - Vascular lesions (hemangioma, sinus pericranii)
  - Extracranial hemorrhage related to birth trauma (caput succedaneum, cephalohematoma, subgaleal hematoma)
  - After the first year of life, malignant tumors, such as Langerhans cell histiocytosis, as well as metastases from neuroblastoma and rhabdomyosarcoma are additional causes of a scalp mass.

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Eye Disorders (PEDHD-31)

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Eye Disorders (PEDHD-31.1)
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Eye Disorders (PEDHD-31.1)

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Criteria

- Eye disorder imaging indications in pediatric individuals are close to identical to those for adult individuals. See **Eye Disorders and Visual Loss (HD-32.1)** in the Head Imaging Guidelines.

Indication	Medically Necessary Imaging Study
◦ Evaluation for congenital disorders or disorders that begin early in life, such as, but not limited to the following: ▪ Optic nerve hypoplasia ▪ Septo-optic dysplasia ▪ Infantile nystagmus syndrome	◦ MRI Orbits/Face/Neck without contrast (CPT® 70540) **OR** ◦ MRI Orbits/Face/Neck without and with contrast (CPT® 70543) **OR** ◦ CT Orbits/Temporal Bone with contrast (CPT® 70481) **OR** ◦ CT Orbits/Temporal Bone without contrast (CPT® 70480) **AND/OR** ◦ MRI Brain without contrast (CPT® 70551) **OR** ◦ MRI Brain without and with contrast (CPT® 70553)

- Repeat imaging is considered medically necessary if requested by a neurologist, ophthalmologist, neuro-ophthalmologist, or neurosurgeon, or in consultation with one of these providers.
- For traumatic retinal hemorrhages as seen in suspected shaken baby syndrome, see **Head Trauma (PEDHD-4.1)**.
- For suspected and/or confirmed neuroblastoma, see **Neuroblastoma (PEDONC-6)**.
- For orbital cellulitis, see **Eye Disorders and Visual Loss (HD-32.1)** and/or **Imaging in Sinusitis (PEDHD-5.2)**.

Background and Supporting Information

- Neuroblastoma may be suspected in the setting of disorders, such as, but not limited to, Opsoclonus-Myoclonus syndrome, Horner's syndrome, and/or choroidal metastases.

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General Guidelines (PEDMS-1.0)

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General Guidelines (PEDMS-1.0)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination, appropriate laboratory studies and basic imaging such as plain x-ray or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) can serve as a pertinent clinical evaluation.
- Plain x-ray as an initial image, or ultrasound as an initial image in a few clinical instances as specified in the following guideline sections, should be done prior to advanced imaging. The results of initial images performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the same body area are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.
- Provider-directed conservative care may be required in specific instances prior to consideration of advanced diagnostic imaging. The criteria for these instances are found within the specific sections of this publication.
- These guidelines are based upon using advanced imaging to answer specific clinical questions that will affect patient management. Imaging is not considered medically necessary if the results will not affect individual management decisions. Standard medical practice would dictate continuing conservative care prior to advanced imaging in individuals who are improving on current treatment programs.

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Age Considerations (PEDMS-1.1)

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Criteria

- Many conditions affecting the musculoskeletal system in the pediatric population have different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals who are under 19 years of age should be imaged according to the Pediatric Musculoskeletal Imaging Guidelines if discussed. Any conditions not specifically discussed in the Pediatric Musculoskeletal Imaging Guidelines should be imaged according to the General Musculoskeletal Imaging Guidelines. Individuals who are 19 years of age or older should be imaged according to the General Musculoskeletal Imaging Guidelines except where directed otherwise by a specific guideline section(CMS, n.d.).

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Appropriate Clinical Evaluation and Conservative Treatment (PEDMS-1.2)

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- This criteria has moved to: **General Guidelines (PEDMS-1.0)**

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Modality General Considerations (PEDMS-1.3)

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- MRI
  - MRI without contrast is the preferred modality for pediatric musculoskeletal imaging unless otherwise stated in a specific guideline section, as it is superior in imaging the soft tissues and can also define physiological processes in some instances, e.g. edema, loss of circulation (AVN), and increased vascularity (tumors).
  - MRI without and with contrast is frequently recommended for evaluation of tumors, infection, post-operative evaluation, arthrography, and juvenile idiopathic arthritis, as described in the disease-specific guideline sections.
  - Due to the length of time required for MRI acquisition and the need to minimize movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous route. In this individual population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
    - If multiple body areas are supported by these guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same imaging session.
  - The presence of surgical hardware or implanted devices may preclude MRI, as magnetic field distortion may limit detail in adjacent structures. CT may be the procedure of choice in these cases.
  - The selection of best examination may require coordination between the provider and the imaging service.
- CT
  - CT without contrast is generally superior to MRI for imaging bone and joint anatomy; thus it is useful for studying complex fractures (particularly of the joints), dislocations, and assessing delayed union or non-union of fractures, integration of bone graft material, if plain x-rays are equivocal.

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        - CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
    - CT beam attenuation can result in streak artifact which can obscure adjacent details. This can occur with radiopaque material such as metal objects or dense bones.
    - The selection of best examination may require coordination between the requesting provider and the rendering imaging facility.
- Ultrasound
    - Ultrasound is frequently used to evaluate infants for hip dysplasia, to detect and/or aspirate joint effusion, and as an initial evaluation of extremity soft tissue masses.
    - CPT® codes vary by body area and the use of Doppler imaging. These CPT® codes are included in the table at the end of this guideline.
- Nuclear Medicine
    - Nuclear medicine studies are commonly used in evaluation of the peripheral musculoskeletal system, and other rare indications exist as well:
        - Bone scan (CPT® 78315), Distribution of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831), or SPECT/CT (CPT® 78830) is considered medically necessary for evaluation of suspected loosening of orthopedic prostheses when recent plain x-ray is nondiagnostic.
        - Nuclear medicine bone marrow imaging (CPT® 78102, CPT® 78103, or CPT® 78104), SPECT (CPT® 78803), or SPECT/CT (CPT® 78830) is considered medically necessary for detection of ischemic or infarcted regions in sickle cell disease.
        - Triple phase bone scan (CPT® 78315) is considered medically necessary for evaluation of complex regional pain syndrome or reflex sympathetic dystrophy.
- 3D Rendering
    - 3D Rendering indications in pediatric musculoskeletal imaging are identical to those in the general imaging guidelines. See: **3D Rendering (MS-3)** for imaging guidelines.
- Bilateral Imaging
    - Coding for bilateral imaging may vary from health care plan to health care plan. Not all coding options may be available for all health care plans.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

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Evidence Discussion (PEDMS-1)

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Advanced imaging in pediatric populations should be based on child-specific clinical questions, expected impact on management, and whether a lower-risk or more targeted image can sufficiently identify the clinical problem. Pediatric practice parameters emphasize that CT should be performed only when clinically indicated and tailored to the diagnostic task. MRI practice parameters emphasize the use of appropriate protocols, supervision, interpretation, and safety screening. First line imaging, such as x-ray, may be essential in determining which cases may need additional advanced radiology (American College of Radiology, 2019; American College of Radiology, 2022; Hryhorczuk et al., 2016). Radiography remains a conventional first-line image choice when osseous injury, alignment abnormality, or skeletal lesion is the clinical concern; advanced imaging is generally most appropriate when radiographs are nondiagnostic, symptoms persist, complications are suspected, or soft-tissue, marrow, cartilage, vascular, or occult injury assessment is needed (American College of Radiology, 2018; Eutsler & Siegel, 2018; Hryhorczuk et al., 2016). In certain clinical situations, ultrasound can be useful in children because it is dynamic, accessible, does not use ionizing radiation, usually avoids sedation, and can assess superficial soft-tissue masses, joint effusions, tendons, vascularity, and contralateral comparison in real time (Eutsler & Siegel, 2018; Hryhorczuk et al., 2016).

CT may be recommended when rapid, high-resolution, cross-sectional anatomic visualization is needed and the result is expected to change acute management, procedural planning, or diagnosis, particularly when alternative nonionizing modalities are unavailable, nondiagnostic, contraindicated, or too slow for the clinical context (American College of Radiology, 2019). Pediatric CT protocols should be optimized for the smallest radiation dose consistent with diagnostic image quality, using child-size parameters, clinical indication-specific protocols, and avoidance of multiphase or repeated acquisitions unless justified (American College of Radiology, 2019). Radiation dose considerations are central in pediatric CT. Children are more radiosensitive and potentially have longer remaining lifespans during which compounded radiation-associated risk could manifest. It is recommended that repeat CT should be avoided when prior imaging or a lower-dose/nonionizing modality can answer the question (American College of Radiology, 2019; Biassoni & Easty, 2017). It is recommended that contrast-enhanced CT should be reserved for indications where contrast will improve diagnosis, staging, vascular assessment, or treatment planning. In their review, Soares et al point out that while acute adverse reactions and contrast-induced nephropathy are generally less common than in adults there has been recent findings of gadolinium deposition in the brain of those with normal renal function; therefore contrast use in children should be considered carefully (Soares et al., 2017).

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MRI is generally favored when high soft-tissue contrast is needed without ionizing radiation, provided that MRI can be completed safely and in a clinically useful timeframe (American College of Radiology, 2022; Biassoni & Easty, 2017). MRI examinations should be performed and interpreted under an established MRI safety program, with screening for implants/devices, acoustic protection, emergency preparedness, and protocol selection that addresses the clinical question while limiting unnecessary sequences or repeated scans (American College of Radiology, 2022). Sedation or general anesthesia may be required for some young children or individuals with developmental delays to obtain accurate MRI studies. The risks associated with sedation should be weighed against the expected clinical benefit and whether a shorter or non-sedated protocol is feasible (Biassoni & Easty, 2017; Graham, 2017). As with CT imaging, it is recommended that contrast-enhanced MRI should be reserved for indications where contrast will improve the chances for a positive outcome or treatment planning (American College of Radiology, 2022; Fraum et al., 2017; Soares et al., 2017). Risk assessment should include renal function, prior contrast reactions, number and timing of prior contrast administrations, and whether more stable agent can be used (Fraum et al., 2017; Soares et al., 2017; Fotenos, 2018). Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast. The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed. (Fotenos, 2018; FDA, 2017).

Pediatric nuclear medicine studies should use pediatric-specific protocols, weight- or body-size-adjusted administered activity, and attention to radiation dose optimization; hybrid SPECT/CT or PET/CT should limit CT dose and anatomic coverage to the clinical need (Biassoni & Easty, 2017; Hindorf et al., 2010). Bone scintigraphy with SPECT and low-dose CT may identify mechanical stress or cortical bone pain generators when MRI does not reveal a cause of symptoms, supporting targeted use as a problem-solving test rather than a routine substitute for MRI (Biassoni & Easty, 2017).

Access to CT and MRI can be limited in some hospitals, and MRI may require general anesthesia in children, adding scheduling complexity, risk, and resource needs (Biassoni & Easty, 2017). Advanced imaging inequities may be avoided by allowing alternative pathways when a preferred modality is unavailable, contraindicated, not tolerated, or likely to require sedation delay; transportation, scanner availability, pediatric anesthesia access, and sub-specialty radiology availability can affect real-world care (Biassoni & Easty, 2017; Graham, 2017).

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References (PEDMS-1)

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Fracture and Dislocation (PEDMS-2)

Guideline

Fracture and Dislocation (PEDMS-2)
Acute Fracture (PEDMS-2.1)
Joint-Adjacent Fracture (PEDMS-2.2)
Growth Plate Injuries (Salter-Harris Fractures) (PEDMS-2.3)
Osteochondral or Chondral Fractures, Including Osteochondritis Dissecans (PEDMS-2.4)
Stress/Occult Fracture (PEDMS-2.5)
Compartment Syndrome (PEDMS-2.6)
Evidence Discussion (PEDMS-2)
References (PEDMS-2)

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Fracture and Dislocation (PEDMS-2)

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General Criteria

- A pertinent clinical evaluation including a detailed history, physical examination, and plain x-ray should be performed prior to considering advanced imaging.

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Acute Fracture (PEDMS-2.1)

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Criteria

- Plain x-rays should be performed initially in any obvious or suspected acute fracture or dislocation.
  - If plain x-rays are positive, no further imaging is considered medically necessary, except in complex (comminuted, displaced or intraarticular) fractures where MRI or CT without contrast is considered medically necessary for preoperative planning.
  - 3D Rendering may sometimes be considered medically necessary for complex fracture repairs. See: **3D Rendering (MS-3)** in the Musculoskeletal Imaging Guidelines.
- Ultrasound (CPT® 76881 or CPT® 76882) is considered medically necessary for evaluation of fracture, but is not required to allow for other advanced imaging, especially in infants. Ultrasound is typically a secondary method of fracture detection when used, though some centers use it as the sole imaging modality for skull and clavicle fractures.
- CT or MRI without contrast is considered medically necessary if plain x-rays are negative or equivocal for fracture, if fracture or bone marrow edema is still clinically suspected, and if the results will determine immediate treatment decisions as documented by the treating physician.
- Bone scan is considered medically necessary for evaluation of suspected acute fracture when two x-rays are negative at least 10 days apart, using any of the following CPT® code combinations:
  - CPT® 78300, CPT® 78305, or CPT® 78306 as a single study
  - Please use: **Stress/Occult Fracture (PEDMS-2.5)** for bone scan indications for stress/occult fracture imaging

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Joint-Adjacent Fracture (PEDMS-2.2)

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Criteria

- CT without contrast is considered medically necessary in complex (comminuted or displaced) fractures seen on plain x-ray involving a joint for preoperative planning.
- CT without contrast is considered medically necessary when there is clinical concern for delayed union or non-union of fracture or joint fusions on follow-up plain x-ray.

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Growth Plate Injuries (Salter-Harris Fractures) (PEDMS-2.3)

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Criteria

- These fractures can generally be diagnosed and managed adequately with plain x-ray.
- In case of severe injury with displacement of bone fractures seen on plain x-ray, CT without contrast is considered medically necessary prior to surgical intervention.
- If there is concern for delayed union or non-union of the bone seen on plain x-ray, CT without contrast is considered medically necessary.
- MRI without contrast is considered medically necessary for the evaluation of a suspected physeal bar in a healing fracture or other complication of a fracture involving the growth plate seen on plain x-ray or CT which may result in abnormal growth.
- Compressive injuries of the growth plate (Salter-Harris V) may be difficult to identify on plain films, and MRI without contrast is considered medically necessary for confirmation.

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Osteochondral or Chondral Fractures, Including Osteochondritis Dissecans (PEDMS-2.4)

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Criteria

- If x-rays are negative and an osteochondral fracture is still suspected, or if x-ray and clinical exam suggests an unstable osteochondral injury, either MRI without contrast, MR arthrogram, or CT arthrogram of the involved joint is considered medically necessary.
- If plain x-rays show a non-displaced osteochondral fragment, follow-up imaging should be with plain x-rays. Advanced imaging is considered not medically necessary.
- MRI without contrast or CT without contrast is considered medically necessary when healing cannot be adequately assessed on follow up plain x-rays.

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Stress/Occult Fracture (PEDMS-2.5)

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Criteria

- These fractures can usually be adequately evaluated by history, physical exam, and x-ray. Advanced imaging may be considered medically necessary as discussed below if the initial evaluation of history, physical exam, and plain x-ray fails to establish a definitive diagnosis.
- Plain x-rays should be performed before advanced imaging. Plain x-rays are often negative initially, but may become positive after 14 days.
- If stress or occult fracture is suspected involving the pelvis, sacrum, hip, femur, tibia, tarsal navicular, proximal 5th metatarsal, or scaphoid, and initial plain x-ray fails to establish a definitive diagnosis:
  - MRI or CT without contrast is considered medically necessary, without conservative care or follow-up plain x-rays OR
  - Bone scan (CPT® 78315, 78306, or 78300), SPECT/CT (CPT® 78830), or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is medically necessary in place of MRI or CT if provider requests
- For all other suspected stress or occult fractures, if follow-up plain x-rays are negative after 10 days of conservative care, or initial non-diagnostic x-ray is obtained a minimum of 14 days after the onset of symptoms:
  - MRI or CT without contrast is considered medically necessary OR
  - Bone scan (CPT® 78315, 78306, or 78300), SPECT/CT (CPT® 78830), or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is medically necessary in place of MRI or CT if provider requests
- Periodic follow-up plain x-rays will usually show progressive healing.
  - CT without contrast is considered medically necessary when there is clinical concern for non-union.

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Compartment Syndrome (PEDMS-2.6)

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Criteria

- Acute compartment syndrome is a clinical diagnosis made by direct measurement of compartment pressure and is a surgical emergency. Advanced imaging is considered not medically necessary.
- See: Compartment syndrome within the **Compartment Syndrome (MS-11.2)** section of the Musculoskeletal Imaging Guidelines.

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Evidence Discussion (PEDMS-2)

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Diagnostic imaging plays a critical role in the evaluation and management of pediatric fractures. Initial imaging with plain radiographs remains the standard for suspected fractures and stress reactions in children, as recommended by the American College of Radiology (ACR) (American College of Radiology, n.d.). When radiographs are inconclusive or negative but clinical suspicion persists, advanced imaging modalities such as MRI and CT are considered appropriate next steps. MRI is highly sensitive and specific for detecting stress fractures and physeal injuries, especially when radiographs are inconclusive (Morrison et al., 2024; Jawetz et al., 2022; Chang et al., 2017). While physeal bars may be seen on CT, some fibrous physeal bars can be missed on CT. As such, MRI is the preferred imaging modality. CT can be useful in assessing cortical bone detail but it involves exposing an individual to ionizing radiation, which may not be recommended in pediatric populations (Kraus & Dresling, 2023; Talijanovic et al., 2019). Ultrasound has been shown to be effective in detecting fractures in infants and young children, making it an option that avoids exposure to radiation and/or sedation (Moritz, 2023; Chauvin & Khwaja, 2022).

The risks of potential harm or adverse effects on pediatric individuals during imaging should be considered. MRI, while highly sensitive and specific, may require sedation in younger children which introduces anesthesia-related risks (Jawetz et al., 2022; Nguyen et al., 2017). CT and bones scans additionally expose children to ionizing radiation, which could carry long term consequences (Kraus & Dresling, 2023; National Institute for Health and Care Excellence, 2016). Ultrasound is generally safe, non-invasive and radiation free; however, it is operator-dependent and diagnostic accuracy can be variable (Moritz, 2023; Chauvin &Khwaja, 2022).

It has been recommended that special consideration be given to imaging of growth plate and overuse injuries in children. Growth plate injuries require careful imaging assessment due to the potential for long-term growth disturbances. MRI is preferred for detailed evaluation of the growth plate and surrounding structure (Nguyen et al., 2017; Wang et al., 2015). Physeal injuries, often resulting from sports or trauma, are best evaluated initially with radiographs. MRI is the preferred modality for assessing cartilage integrity and subchondral bone involvement, aiding in treatment planning and prognosis (Wang et al., 2015; Jawetz et al., 2015).

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Soft Tissue and Bone Masses (PEDMS-3)

Guideline

Soft Tissue and Bone Masses – General Considerations (PEDMS-3.1)
Soft Tissue Mass with Negative X-ray and Abnormal Ultrasound (PEDMS-3.2)
Soft Tissue Mass with Calcification/Ossification on X-ray (PEDMS-3.3)
Mass Involving Bone (Including Suspected Lytic and Blastic Metastatic Disease) (PEDMS-3.4)
Evidence Discussion (PEDMS-3)
References (PEDMS-3)

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Soft Tissue and Bone Masses – General Considerations (PEDMS-3.1)

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Criteria

- A pertinent clinical evaluation including a detailed history and physical examination should be performed prior to considering advanced imaging.
  - History and physical exam of any palpable soft tissue mass should include documentation of any of the following pertinent clinical features: location, size, and any association with pain.
- Plain x-rays should be performed as initial imaging. This is true even for soft tissue masses that are clearly not directly associated with osseous structures.
- Ultrasound (CPT® 76881 or CPT® 76882) is considered medically necessary if initial plain x-ray is negative to evaluate:
  - ill-defined masses or areas of swelling
  - hematomas
  - subcutaneous lipomas with inconclusive clinical examination
  - lipomas in other locations
  - masses that have been present and stable for up to, or more than, 1 year
  - vascular malformations (see: **Vascular Anomalies (PEDPVD-2)** in the Pediatric Peripheral Vascular Disease Imaging Guidelines)
- MRI without and with contrast or without contrast is considered medically necessary for any of the following:
  - soft tissue mass greater than 5 cm in diameter
  - soft tissue mass increasing in size
  - painful soft tissue mass
  - deep soft tissue mass or subfascial location
- Advanced imaging is considered not medically necessary for the following entities:
  - ganglion cysts that can be diagnosed by history and physical examination
  - sebaceous cysts as these cysts are benign and additional imaging typically will not change the treatment plan
  - hematomas as these are benign and additional imaging typically will not change the treatment plan
  - subcutaneous lipomas when surgery is not planned
    - MRI without or without and with contrast can be performed if surgery is planned.
- MRI without and with contrast, or ultrasound (CPT® 76881 or CPT® 76882) is considered medically necessary for lipomas in other locations (not subcutaneous).

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Soft Tissue Mass with Negative X-ray and Abnormal Ultrasound (PEDMS-3.2)

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Criteria

- MRI without and with contrast is considered medically necessary when plain x-ray is negative and ultrasound is abnormal.
  - CT without or with contrast is considered medically necessary if MRI is contraindicated.

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Soft Tissue Mass with Calcification/ Ossification on X-ray (PEDMS-3.3)

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Criteria

- MRI without and with contrast is considered medically necessary when calcification/ ossification is noted on plain x-ray.
  - CT without or with contrast is considered medically necessary if MRI is contraindicated.

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Mass Involving Bone (Including Suspected Lytic and Blastic Metastatic Disease) (PEDMS-3.4)

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Criteria

- Plain x-rays of the entire bone containing the lesion are required prior to consideration of advanced imaging. Many benign bone tumors have a characteristic appearance on plain x-ray and advanced imaging is considered not medically necessary unless one of the following applies:
  - MRI without and with contrast and/or CT without is medically necessary for preoperative planning.
  - MRI without and with contrast is medically necessary when the diagnosis is uncertain based on plain x-ray appearance.
    - CT without or with contrast is considered medically necessary if MRI is contraindicated.
- Surveillance of benign bony lesions is with plain x-ray
  - MRI without and with contrast is considered medically necessary for new findings on x-ray, or new or worsening clinical symptoms not explained by recent x-ray.
- Osteochondroma, osteoid osteoma, osteogenic sarcoma, and Ewing sarcoma family of tumors should be imaged according to **Bone Tumors (PEDONC-9)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- If there is concern for metastatic disease in an individual with a known malignancy, refer to the appropriate Pediatric and Special Populations Oncology Imaging Guideline.

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Evidence Discussion (PEDMS-3)

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Diagnostic imaging plays a critical role in evaluating soft and bony tissue masses in pediatric patients. The American College of Radiology (ACR) recommends radiography as the initial imaging modality for suspected soft tissue and bone masses in children, as it provides essential information with minimal radiation exposure (Ahlawat et al., 2024, Garner et al., 2022). Details such as soft tissue calcification, presence or absence of phleboliths, radiographic density, and any effect on adjacent bone are all potentially significant plain film findings that may help better identify the etiology of the mass and determine the optimal modality and contrast level when advanced imaging is indicated. Evaluation by a surgical specialist or oncologist is strongly recommended to help determine the most helpful advanced imaging studies for an individual.

For superficial soft tissue masses, ultrasound (US) is highly recommended as an imaging tool. It is non-invasive, free of ionizing radiation, and has demonstrated high sensitivity and specificity in characterizing superficial lesions in pediatric populations (Jacobson et al., 2022; Hung et al., 2020; Sheybani et al., 2016). US can effectively differentiate cystic from solid masses and guide clinical management, including decisions regarding biopsy or surgical intervention. However, MRI may be necessary for preoperative planning or when deeper anatomical involvement is suspected (Arndt et al., 2020; Garner et al., 2022).

When radiographs are inconclusive or when malignancy is suspected, MRI without and with intravenous contrast is considered an appropriate next step. MRI offers superior soft tissue contrast and multiplanar capabilities, which are particularly valuable in pediatric patients due to their smaller anatomical structures and the need to avoid ionizing radiation (Ahlawat et al., 2024; Garner et al., 2022; Sargar et al., 2016; Sheybani et al., 2016). However, MRI may require the use of sedation which could introduce anesthesia-related risks to consider (Garner et al., 2022). CT may be used when MRI is contraindicated, but its use should be judicious given the increased sensitivity of children to radiation (National Cancer Institute, 2002).

Health equity considerations are essential in pediatric imaging. Children from under-served communities may face barriers to accessing advanced imaging modalities (Rochwerger & Mattei, 2018). Evidence supports the use of US and radiography as cost-effective and accessible options that maintain diagnostic accuracy while minimizing risk. Ensuring equitable access to appropriate imaging is critical for timely diagnosis and treatment across diverse pediatric populations.

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Limping Child (PEDMS-4)

Guideline

General Evaluation of the Limping Child (PEDMS-4.1)
Limping Child with Suspected Trauma (PEDMS-4.2)
Limping Child with Suspected Infection (PEDMS-4.3)
Limping Child with No Evidence of Trauma or Infection (PEDMS-4.4)
Evidence Discussion (PEDMS-4)
References (PEDMS-4)

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General Evaluation of the Limping Child (PEDMS-4.1)

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Criteria

- This guideline primarily applies to children age 5 and under. It may also be applied to older children with pre-existing conditions who may not be able to communicate, such as a child with significant intellectual disability or other developmental delay. Many of these cases will be urgent, because of the risk of adverse outcomes in a delay of diagnosis.
- A pertinent clinical evaluation, including a detailed history and physical examination, should be performed, which will help determine any indication for advanced imaging. Based on this clinical evaluation, the most likely etiology should be determined, usually trauma, infection, or neither trauma nor infection.
- X-ray should be obtained if there are no localized findings on physical examination.

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Limping Child with Suspected Trauma (PEDMS-4.2)

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Criteria

- Plain x-rays are indicated for detection of fractures, destructive lesions, and avascular necrosis. For children under age 4 this may require x-rays of the entire leg from hip to foot. If clinical suspicion is high for “toddler fracture,” imaging may start with tibia/fibula x-rays, and if a fracture is demonstrated, additional imaging may not be required.
- If initial x-rays are negative, but limping symptoms or avoidance of weight-bearing persist, follow-up x-rays in 7 to 10 days are considered medically necessary.
  - If plain films are negative and suspicion remains high for stress fractures or soft tissue injury, the following are considered medically necessary:
    - MRI without contrast of the affected body area OR
    - Radionuclide bone scan (CPT® 78300, CPT® 78305, CPT® 78306, or CPT® 78315), SPECT/CT (CPT® 78830), or SPECT (CPT® 78803) if implanted hardware or devices precluding MRI are present.
- CT use is considered not medically necessary in the evaluation of the limping child with suspected trauma.

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Limping Child with Suspected Infection (PEDMS-4.3)

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Criteria

- Pain localized to hip:
  - It is essential to exclude septic arthritis. Ultrasound of the hip (CPT® 76881 or 76882) is used to exclude hip joint effusion.
    - Hip joint fluid aspiration to distinguish infection from non-infectious etiologies If hip joint effusion is demonstrated.
    - Plain x-rays should be obtained if no hip joint effusion is demonstrated.
  - MRI without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is considered medically necessary if plain films are not diagnostic.
- Pain localized distal to hip:
  - MRI without contrast or without and with contrast of the affected body part is considered medically necessary if plain x-rays are not diagnostic.
- Non-localized pain:
  - Plain x-rays of the spine, pelvis, and lower extremities may be considered medically necessary to localize the abnormality.
  - If plain x-ray is not diagnostic and suspicion for infection remains high, one of the following:
    - Whole-body bone scan (CPT® 78306) OR
    - SPECT (CPT® 78803) OR
    - SPECT/CT (CPT® 78830) OR
    - MRI without contrast or without and with contrast of the affected body area

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Limping Child with No Evidence of Trauma or Infection (PEDMS-4.4)

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Criteria

- Transient (or toxic) synovitis of the hip:
  - Ultrasound of the hip (CPT® 76881 or CPT® 76882) is the medically necessary initial exam.
    - Plain x-rays if no hip effusion is demonstrated.
    - Hip joint fluid aspiration is indicated if a hip joint effusion is demonstrated. This is usually performed with US guidance, though fluoroscopic guidance or blind aspiration may be required.
- Avascular Necrosis, please use: **Avascular Necrosis (AVN)/ Legg-Calvé-Perthes Disease (PEDMS-6)**
- Juvenile Idiopathic Arthritis, please use: **Juvenile Idiopathic Arthritis (PEDMS-10.1)**
- Histiocytic Disorders, please use: **Histiocytic Disorders (PEDONC-18)** in the Pediatric and Special Populations Oncology Imaging Guidelines
- Neoplasm, please use: **General Guidelines (PEDONC-1)**, **Pediatric Leukemias (PEDONC-3)**, **Neuroblastoma (PEDONC-6)**, **Pediatric Soft Tissue Sarcomas (PEDONC-8)**, or **Bone Tumors (PEDONC-9)** in the Pediatric and Special Populations Oncology Imaging Guidelines
- Child Abuse, please use: **Suspected Physical Child Abuse (PEDMS-7)**

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Evidence Discussion (PEDMS-4)

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For children age 5 and under, advanced imaging is generally not first-line for an acutely limping child when symptoms are nonlocalized or localized without concern for infection. A detailed clinical history and physical examination, including radiographs, should be performed and may be sufficient to guide initial evaluation. Radiographs are recommended for most children with suspected fracture and may also reveal periosteal reaction, congenital/developmental abnormalities, or neoplasm. Initial radiographs may be negative, but presumptive treatment and/or follow-up radiographs may be appropriate before CT or MRI unless atypical features, severe symptoms, or alternative diagnoses are suspected (Chaturvedi et al., 2018; Herman & Martinek, 2015; Safdar et al., 2018).

CT should be limited because of ionizing radiation and used primarily for detailed characterization of selected osseous abnormalities or occult fractures when radiographs are inadequate (Safdar et al., 2018). MRI may be appropriate as a secondary test when persistent symptoms, findings, or abnormal radiographs suggest marrow disease, neoplasm, osteonecrosis, or occult injury not clearly shown by radiographs. MRI is able to provide imaging of bone marrow, joints, and soft tissues without ionizing radiation (Chaturvedi et al., 2018; Herman & Martinek, 2015; Safdar et al., 2018). Bone scintigraphy may be considered when symptoms are nonlocalized and infection or multifocal osseous disease is suspected, but its use should be selective because it involves ionizing radiation and generally has been displaced by MRI where MRI is available and feasible (Karout & Naffaa, 2022; Safdar et al., 2018).

When there is concern for infection in the limping child, MRI of the lower extremity without or without-and-with IV contrast is usually appropriate as secondary advanced imaging. MRI or 3-phase bone scan may be appropriate when localization is unclear or multifocal disease is suspected (Safdar et al., 2018). MRI supports detection of osteomyelitis, septic arthritis, pyomyositis, abscess, and other soft-tissue or marrow abnormalities. Prompt imaging is important in these instances because septic arthritis and osteomyelitis can deteriorate rapidly and cause long-term sequelae if diagnosis is delayed (Chaturvedi et al., 2018; Herman & Martinek, 2015; Hryhorczuk et al., 2016). CT is usually not appropriate for suspected infection in this clinical setting because MRI better evaluates marrow and soft-tissue infection without ionizing radiation (Safdar et al., 2018; Herman, 2015). Ultrasound is the modality of choice for detecting hip effusion and can guide the decision to aspirate. It may not reliably distinguish transient synovitis from septic arthritis in early disease stages but usually is used to guide fluoroscopic aspiration (Hryhorczuk et al., 2016; Karout & Naffaa, 2022). When hip effusion is present and clinical/laboratory findings suggest septic arthritis, diagnostic aspiration and orthopedic management should not be delayed for additional advanced imaging unless needed to define adjacent osteomyelitis, abscess, or non-hip infection source (Herman

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& Martinek, 2015; Hryhorczuk et al., 2016; Safdar et al., 2018). With symptoms localized to a lower extremity site other than the hip/pelvis and concern for infection, MRI of the area of interest without or without-and-with IV contrast is usually appropriate (Safdar et al., 2018).

Imaging decisions should account for safety and feasibility in children, including radiation exposure from CT and bone scan, MRI availability and potential need for sedation in younger children, and whether ultrasound can triage the need for advanced imaging without radiation or sedation (Herman & Martinek, 2015; Hryhorczuk et al., 2016; Safdar et al., 2018).

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Developmental Dysplasia of the Hip (PEDMS-5)

Guideline

Developmental Dysplasia of the Hip (PEDMS-5)
Evidence Discussion (PEDMS-5)
References (PEDMS-5)

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Developmental Dysplasia of the Hip (PEDMS-5)

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Criteria

Screening studies

- Screening ultrasound (CPT® 76885 or CPT® 76886) is considered medically necessary for infants between 4 weeks of age and 4 months of age with one or more of the following risk factors:
  - breech presentation
  - family history of DDH
  - abnormal hip exam (e.g., positive Ortolani or Barlow maneuvers, asymmetric thigh folds, shortening of the thigh observed on the dislocated side, limitation of hip abduction)
- For children between 4 and 6 months of age, plain x-ray is the initial imaging modality as femoral head ossification is often seen on x-ray by this age.
  - If x-ray is inconclusive, ultrasound (CPT® 76885 or CPT® 76886) is considered medically necessary.

Follow-Up/Diagnostic Studies

- Ultrasound is considered medically necessary earlier than 4 weeks of age in individuals with unstable/dislocated hip(s) undergoing abduction brace treatment.
- Follow-up hip ultrasound (CPT® 76885 or CPT® 76886) is considered medically necessary for the following:
  - Graf type IIA hip with an alpha angle (bony angle) between 50 to 59 degrees in a child less than 3 months of age and follow up hip ultrasound is requested to confirm normal development
  - Subluxation or dislocation was diagnosed on previous hip ultrasound using the dynamic Harke imaging method
  - Prior ultrasound demonstrates abnormal hip and treatment has been applied (such as a Pavlik harness or other device) to document effectiveness of treatment, to ensure the femoral head remains located in the acetabulum, or to identify treatment failure.
    - The usual interval for follow-up sonography is monthly, but earlier imaging is considered medically necessary for clinical suspicion of treatment failure, subluxation or dislocation of the hip.

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- MRI without and with contrast (CPT® 73723), MRI without contrast (CPT® 73721), or CT without contrast (CPT® 73700) is considered medically necessary to evaluate alignment following reduction. Children in casts or following surgery may require repeated advanced imaging to ensure the reduction remains satisfactory, or to assess incorporation of bone graft material.
- Hip ultrasound is considered NOT medically necessary for the following:
  - Infants older than 6 months of age as plain x-ray of the hips become more reliable due to femoral head ossification.
  - Type I, IIB, IIC, IID, and III hips diagnosed on a previous hip ultrasound using the Graf method. Type I hip is normal, and Type IIB, IIC, IID, and III will have imaging as directed by treating provider.
  - Plain x-ray of the hips should be performed rather than ultrasound if there is a clinical suspicion for teratogenic dysplasia.

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Evidence Discussion (PEDMS-5)

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Imaging plays an important role in the evaluation and assessment of developmental dysplasia of the hip (DDH). In the American College of Radiology Appropriateness Criteria, American Academy of Pediatrics recommendations and the American Academy of Orthopedic Surgeons Guideline, it is recommended that ultrasound (US) is appropriate for initial screening, diagnostic and follow-up of infants between 4 week and 4 months of age with risk factors for DDH (e.g., breech presentation, family history, abnormal exam) or earlier than 4 weeks of age in individuals undergoing abduction brace treatment. Hip laxity is normal after birth and usually resolves spontaneously. The routine use of ultrasound in screening neonates and infants without risk factors for developmental dysplasia of the hip (DDH) is not recommended (Mulpuri et al., 2015; Nguyen et al., 2018; Shaw et al., 2016). US has been demonstrated to have sensitivity and specificity above 90% for detecting hip instability in early infancy and does not introduce any radiation exposure (Barrera et al., 2019; Nguyen et al., 2018; Shaw et al., 2016). Radiographs are recommended as initial imaging after 4-6 months of age, when femoral head ossification is able to be seen, providing improved diagnostic accuracy (Karout & Naffaa, 2022; Nguyen et al., 2018).

MRI has been recommended for use to evaluate hip alignment following reduction. Post-reduction evaluation may require assessment of adjacent soft tissues and MRI would be the best modality for complete visualization (Barrera et al., 2019; Nguyen et al., 2018; Rosenbaum et al., 2016). The use of MRI avoids ionization radiation, but it may require sedation and/or contrast media which could introduce additional risks such as respiratory depression or allergic reaction (Rosenbaum et al., 2016). In situations where MRI is contraindicated or not available, CT has been recommended as an alternative. Its use is often limited to special circumstances, however, due to radiation exposure (Karout & Naffaa, 2022; Nguyen et al., 2018).

Access to advanced imaging may be limited in areas with reduced resources, such as rural and under-served communities. Delays in accessing advanced imaging can disproportionately affect those in these socioeconomic situations. This may lead to a greater reliance on radiographs and ultrasound in those with limited access to avoid delays in diagnosis and appropriate (Karout et al., 2022; Shaw et al., 2016).

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Avascular Necrosis (AVN) / Legg-Calvé-Perthes Disease / Idiopathic Osteonecrosis (PEDMS-6)

Guideline

Avascular Necrosis and Legg-Calvé-Perthes Disease (PEDMS-6.1)
Osteonecrosis (PEDMS-6.2)
Evidence Discussion (PEDMS-6)
References (PEDMS-6)

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Avascular Necrosis and Legg-Calvé-Perthes Disease (PEDMS-6.1)

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Criteria

- Plain x-ray is the initial imaging study.
- MRI Hip without contrast (CPT® 73721) or MRI Hip without and with contrast (CPT® 73723) is considered medically necessary if the diagnosis is uncertain on plain x-ray, or for preoperative planning.
  - If MRI is contraindicated or unavailable, any one of the following studies is considered medically necessary:
    - CT scan without contrast, OR
    - Nuclear bone scan (CPT® codes: 78300, 78305, 78306, or 78803) OR
    - SPECT/CT (CPT® 78830)

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Osteonecrosis (PEDMS-6.2)

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Criteria

- Individuals with acute lymphoblastic leukemia, lymphoblastic lymphoma, or other conditions with recurrent exposure to high dose corticosteroids and known or suspected osteonecrosis should be imaged according to guidelines in: **Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Known or suspected osteonecrosis in long-term cancer survivors should be imaged according to guidelines in: **Osteonecrosis in Long Term Cancer Survivors (PEDONC-19.4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- X-ray is considered medically necessary as initial imaging study.
- MRI either without contrast or without and with contrast is considered medically necessary in other individuals with concern for osteonecrosis and negative or inconclusive recent x-ray, if imaging results will change current individual management. Early phase of osteonecrosis may be seen on MR with normal x-ray findings.
  - CT scan without contrast is considered medically necessary for surgical planning.

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Evidence Discussion (PEDMS-6)

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Plain radiography remains the typical first-line imaging modality in children with hip or extremity pain and suspected avascular necrosis because of its broad availability and low cost. Radiographs can help exclude other causes of pain (e.g., fracture, slipped capital femoral epiphysis, tumor). When additional diagnostic investigation is needed, MRI is recommended for early detection of osteonecrosis and similar conditions in children due to superior sensitivity and lack of ionizing radiation (Dillman & Hernandez, 2009; Ha et al., 2022; Laine et al., 2018).

Computed tomography (CT) and nuclear medicine modalities (bone scintigraphy, SPECT) may have a role in diagnosing children when MRI is inconclusive or contraindicated, or when detailed assessment of subchondral bone, articular surface integrity, or collapse is needed. CT provides excellent visualization of the bony architecture and degree of structural compromise but involves ionizing radiation and is less preferred in a pediatric context unless structural detail will change management (Cariello et al., 2024; Ha et al., 2022; Marin et al., 2024). Ultrasound can be useful adjunctively (e.g., effusion detection, hip containment in Legg-Calve-Perthes Disease) but has limited sensitivity and specificity for early ON/AVN (Ng et al., 2024).

MRI is recommended to evaluate suspicion of Legg-Calve-Perthes Disease. Especially during the early stages of clinical evaluation and diagnosis. Early on, radiographs alone may be insufficient to display structural changes around the femoral head and could lead to a delay in diagnosis (NG et al., 2024). MRI has been shown to be most sensitive in visualizing early ischemic changes before radiographic findings are visible (Dillman & Hernandez, 2009; Laine et al., 2018).

MRI screening in pediatric oncology populations has demonstrated detection of subclinical lesions, enabling earlier surveillance and management (Cariello et al., 2024; Kaste et al., 2011). The lack of ionizing radiation is particularly relevant in children who require repeated imaging during growth and long term follow up (Goo, 2015; Kaste et al., 2011; Kuhlen et al., 2017). In children treated for risk factors such as high dose corticosteroids (e.g., in acute lymphoblastic leukemia), malignancy, bone marrow transplantation, or other bone/vascular insults, the literature supports that advanced imaging—particularly MRI—is more sensitive and specific for early ON/AVN prior to collapse of the epiphysis or femoral head (Kaste et al., 2011; Kuhlen et al., 2017).

The risks of exposing pediatric individuals to harm should be a consideration during diagnostic imaging. MRI avoids exposure to ionizing radiation and is recommended over CT and bone scan when at all possible (Goo, 2015; Ha et al., 2022; Marin et al., 2024; Rao et al., 2019). MRI may also allow for earlier detection of osteonecrosis/ avascular necrosis before collapse when compared to CT or bone scan. Earlier detection could allow for improved outcomes including long-term joint preservation and

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reducing the need for surgical intervention (Ng et al., 2024; Rao et al., 2019). It has also been recommended to weigh the benefits versus the risks in the use of sedation and contrast media when selecting an appropriate imaging modality. Complications such as respiratory compromise or allergic reaction could occur (Marin et al., 2024). There may also be inequities in access to appropriate imaging which may require specific consideration. Pediatric ON/AVN disproportionately affects adolescents, children treated in lower-socioeconomic settings, and survivors of childhood cancer; ensuring access to advanced imaging may mitigate disparities in joint salvage outcomes (Basit & Khoshhal, 2022; Ha et al., 2022; Rao et al., 2019).

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Suspected Physical Child Abuse (PEDMS-7)

Guideline

Suspected Physical Child Abuse (PEDMS-7)
Evidence Discussion (PEDMS-7)
References (PEDMS-7)

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Suspected Physical Child Abuse (PEDMS-7)

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Criteria

The suspicion of physical abuse of a child often requires imaging, both for clinical management and for forensic purposes. Every effort should be made to support reasonable requests for imaging in these children.

Fractures are common, but injuries may also involve visceral organs and/or soft tissue. Some fracture patterns are highly correlated with non-accidental mechanisms, such as the classic metaphyseal lesion, also known as a corner fracture or bucket handle fracture. Unsuspected fractures, multiple fractures at various stages of healing, or fractures inconsistent with the history provided, may raise the suspicion for physical abuse.

Skeletal Injury

- The x-ray skeletal survey is the primary imaging procedure for detecting fractures, especially in children age 24 months or younger. In older children, skeletal survey may be considered medically necessary, but more tailored x-ray evaluation based on history and physical examination may be preferable to skeletal survey.
- When skeletal survey is negative, but clinical suspicion remains high, either of the following are considered medically necessary:
  - Bone scan (CPT® codes: CPT® 78300, 78305, 78306, 78315, or 78830) OR
  - Distribution of Radiopharmaceutical Agent SPECT (CPT® 78803)
- Suspected injury to the spine should usually first be evaluated with plain x-rays. CT without contrast and/or MRI without contrast or without and with contrast may be required for complete evaluation of osseous and soft tissue spine injuries. If requested for suspected or known physical abuse, both CT without contrast and/or MRI without contrast or without and with contrast of suspected sites are considered medically necessary.
- CT Chest without contrast (CPT® 71250) is considered medically necessary in individuals with a negative skeletal survey and a high clinical suspicion for rib fracture associated with child abuse.
- A repeat skeletal survey performed approximately 2 weeks after the initial examination can provide additional information on the presence and age of child abuse fractures and should be performed when abnormal or equivocal findings are found on the initial study and when abuse is suspected on clinical grounds.

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Head Injury

- CT Head without contrast (CPT® 70450) is considered medically necessary when there is clinical evidence of head injury or when skull fracture of any age is detected on survey skull x-ray.
  - CT Head without contrast (CPT® 70450) is also considered medically necessary when known or suspected cervical trauma is present in a pediatric individual.
  - CT Head without contrast (CPT® 70450) is considered medically necessary in individuals less than 1 year of age, even if no neurologic symptoms are detected due to the great potential morbidity of abuse head trauma. MRI Brain without contrast (CPT® 70551) is also considered medically necessary.
  - MRI Spine without contrast (CPT® 72141, 72146, 72148) or without and with contrast (CPT® 72156, 72157, 72158) is considered medically necessary when there is clinical evidence of head injury or when skull fracture of any age is detected on survey skull x-ray. CT Spine (CPT® 72125, CPT® 72128, CPT® 72131) is considered medically necessary if MRI is not readily available.
- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is considered medically necessary to evaluate brain parenchymal injury, or in a child where the clinical signs of brain injury are not sufficiently explained by CT findings.

Other Body Area Injuries

- CT should be performed with contrast unless an absolute contraindication exists.
- ANY of the following imaging studies are considered medically necessary for suspected injury to the abdomen or pelvis:
  - Abdominal ultrasound (CPT® 76700)
  - Pelvic ultrasound (CPT® 76856)
  - CT Abdomen with contrast (CPT® 74160)
  - CT Pelvis with contrast (CPT® 72193)
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- ANY of the following imaging studies are considered medically necessary for suspected injury to the chest:
  - CT Chest without contrast (CPT® 71250)
  - CT Chest with contrast (CPT® 71260)

Screening of other children

- Contacts are defined as the asymptomatic siblings, cohabiting children, or children under the same care as an index child with suspected child physical abuse. All contact children should undergo a thorough physical examination and a history elicited prior to imaging. Contact children younger than 12 months should have neuroimaging, and skeletal survey. CT Head without contrast (CPT® 70450) or MRI Brain without contrast (CPT® 70551) is considered medically necessary. Contact

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children aged 12 to 24 months should undergo skeletal survey. No routine imaging is considered medically necessary in asymptomatic children older than 24 months.

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Evidence Discussion (PEDMS-7)

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Imaging for the evaluation of suspected physical abuse of a child is critical to both the success of clinical management and for forensic investigation. In children under 2 years of age, radiographic skeletal surveys are typically recommended as the cornerstone for detecting fractures in suspected abuse (Bennett & Christian, 2021; Mankad et al., 2023; Mirsky et al., 2025). Skeletal surveys may still be helpful in older children, but when a more thorough history can be obtained, a tailored radiographic examination may be appropriate. When radiographic examinations are negative but clinical suspicion remains bone scan is recommended as it is useful in detecting subtle fractures (Bennett & Christian, 2021; Mirsky et al., 2025).

Radiographs may not always be sufficient in the examination of suspected physical abuse. MRI has been recommended, especially in suspected spine and head injury, and is preferred over CT in its ability to detect ligamentous and cord injury (Henry & Wood, 2018; Karmazyn, Reher, et al., 2022; Society and College of Radiographers & The Royal College of Radiologists, 2018). CT can be a helpful option to provide improved bony details in assessing head and spine injury or when MRI is contraindicated or unavailable (Karmazyn, Marine, et al., 2022; Mirsky et al., 2025). When acute intracranial injury is suspected or skull fracture is detected on radiograph, CT of the head is recommended as a first-line imaging due to its speed and sensitivity (Henry & Wood, 2018; Karmazyn, Marine et al., 2022; Mirsky et al., 2025). Additionally, MRI of the spine is also recommended in cases of clinical evidence of head injury or detection of skull fracture to add diagnostic value beyond head imaging (Henry & Wood, 2018; Karmazyn, Reher, et al., 2022). CT of the abdomen and pelvis, with contrast, is recommended when there is concern for visceral injury (Henry et al., 2021; Karmazyn, Marine et al., 2022; Mirsky et al., 2025). CT of the chest may also be of use as it can help detect rib fractures and other injury not evident on radiographs (Karmazyn, Marine et al., 2022; Mirsky et al., 2025).

When appropriate, MRI is recommended over CT or bone scan to eliminate risks associated with exposure to radiation. However, MRI may require sedation which presents other risks such as respiratory depression (Henry et al., 2021; Karmazyn, Marine et al., 2022; Karmazyn, Reher, et al., 2022; Mirsky et al., 2025. Acute traumatic cases, or individuals with limited access to imaging types, may be better served by the type of image that can provide a diagnosis in a timely manner to avoid harm due to delays in diagnosis (Henry & Wood, 2018; Mankad et al., 2023; Society and College of Radiographers & The Royal College of Radiologists, 2018).

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Infection/Osteomyelitis (PEDMS-8)

Guideline

Infection/Osteomyelitis (PEDMS-8)
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Infection/Osteomyelitis (PEDMS-8)

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Criteria

- Infection and osteomyelitis imaging indications in pediatric individuals are similar to those for adult individuals other than the limping child.
  - Please use: **General Infection/Osteomyelitis (MS-9.1)** and **Charcot and Septic Joint (MS-9.2)** in the Musculoskeletal Imaging Guidelines for circumstances other than in the limping child.
  - Please use: **Limping Child with Suspected Infection (PEDMS-4.3)** for imaging guidelines when limping is present.
  - Please use: **Inflammatory Musculoskeletal Disease (PEDMS-10)** for imaging guidelines for chronic recurrent multifocal osteomyelitis (CRMO, which is an autoimmune disease).
- Ultrasound of the involved extremity (CPT® 76881 or CPT® 76882) is considered medically necessary to evaluate for effusion or soft tissue fluid collection.
  - Ultrasound is not a prerequisite for other advanced imaging studies.
- Bone scan (CPT® 78300, 78305, 78306, or 78315), SPECT/CT (CPT® 78830, or 78832), or SPECT (CPT® 78803, or 78831) is considered medically necessary for evaluation of suspected bone infection if MRI cannot be done and when:
  - infection is multifocal, or
  - when the infection is associated with orthopedic hardware or chronic bone alterations from trauma or surgery.
  - Combining with a labeled leukocyte scan: A labeled leukocyte scan (radiopharmaceutical localization of tumor, inflammatory process, or distribution of radiopharmaceutical agent(s) imaging) - one of the following CPT® codes:
    - CPT® 78800, CPT® 78801, 78802, or CPT® 78803 in concert with Tc-99m sulfur colloid marrow imaging (one of CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104) or SPECT/CT (CPT® 78830) is medically necessary in cases with altered bone marrow distribution, such as joint prosthesis.

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Evidence Discussion (PEDMS-8)

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In infants and young children, osteomyelitis may involve the epiphysis, transphyseal vessels, growth cartilage, and adjacent joint areas. Young children may present with refusal to bear weight, pseudoparalysis, irritability, or nonspecific systemic symptoms, so imaging should be guided by the suspected anatomic region and by the need to find occult foci or complications. Ultrasound can assess effusion and superficial collections, but whole-region or whole-body imaging may be needed when symptoms are nonspecific or multifocal disease is suspected (Funk & Copley, 2017; Jaramillo et al., 2017; Robinette & Shah, 2020). Ultrasound, bone scintigraphy/SPECT, and labeled leukocyte scintigraphy have selective roles in pediatric osteomyelitis evaluation; they are most useful when clinical localization is uncertain, when rapid bedside assessment for joint or soft-tissue complications is needed, or when MRI is unavailable, contraindicated, nondiagnostic, or impractical (Jaramillo et al., 2017; Lee et al., 2016; Shet et al., 2022).

Ultrasound has no ionizing radiation, is generally well tolerated, and usually does not require sedation, making it a favorable imaging choice for locating effusion, abscess, or superficial subperiosteal collection in children (Lee et al., 2016; Shet et al., 2022). The American College of Radiology pediatric criteria for suspected extremity osteomyelitis or septic arthritis rate ultrasound as usually appropriate initial imaging in children younger than 5 years (Shet et al., 2022). Ultrasound is most useful when symptoms are localized near a joint or superficial bone because it can rapidly detect joint effusion, soft-tissue abscess, periosteal elevation, and subperiosteal fluid collection (Jaramillo et al., 2017; Lee et al., 2016; Shet et al., 2022). Ultrasound can guide diagnostic aspiration or drainage of joint effusion, abscess, or subperiosteal fluid, which is important when microbiologic confirmation or source control is needed (Jaramillo et al., 2017; Shet et al., 2022).

Three-phase bone scintigraphy, with or without SPECT/SPECT-CT, may be medically necessary when osteomyelitis is suspected but symptoms are poorly localized, multifocal disease is a concern, or MRI is unavailable or contraindicated. It is less favored as routine imaging because it involves ionizing radiation and has limited specificity in abnormal bone (Lee et al., 2016; Palestro, 2015; Shet et al., 2022). Bone scintigraphy has high sensitivity for increased osteoblastic activity, making it useful for detecting clinically occult or multifocal sites. However, trauma, fracture, surgery, tumor, or other inflammatory bone conditions may decrease specificity (Lee et al., 2016; Palestro, 2015). SPECT improves lesion localization compared with scintigraphy and can increase diagnostic confidence when planar findings are equivocal. Hybrid SPECT/CT adds anatomic information but introduces additional CT-related radiation and should be used only when the expected benefit justifies exposure (Lee et al., 2016; Palestro, 2015). Labeled leukocyte scintigraphy may be medically necessary for complicated osteomyelitis, postoperative or hardware-associated infection, abnormal underlying

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bone, or equivocal bone scan when MRI is unavailable or nondiagnostic (Palestro, 2015; Shet et al., 2022). However, bone scan and SPECT are generally less preferred due to lower specificity and radiation exposure. The use of nuclear scans is recommended only in very specific clinical situations.

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Foreign Body (PEDMS-9)

Guideline

Foreign Body (PEDMS-9)

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Foreign Body (PEDMS-9)

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- Foreign body imaging indications in pediatric individuals are similar to those for adult individuals. Please use: **Foreign and Loose Bodies (MS-6.1)** for imaging guidelines.

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Inflammatory Musculoskeletal Disease (PEDMS-10)

Guideline

Inflammatory Musculoskeletal Disease (PEDMS-10.0)
Juvenile Idiopathic Arthritis (PEDMS-10.1)
Chronic Recurrent Multifocal Osteomyelitis (PEDMS-10.2)
Inflammatory Muscle Diseases (PEDMS-10.3)
Evidence Discussion (PEDMS-10)
References (PEDMS-10)

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Inflammatory Musculoskeletal Disease (PEDMS-10.0)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination, and plain x-rays should be performed prior to considering advanced imaging.
- Inflammatory arthritis imaging indications in pediatric individuals are very similar to those for adult individuals. Please use: **Inflammatory Arthritis (MS-12.2)** in the Musculoskeletal Imaging Guidelines.
- Specific pediatric considerations for juvenile idiopathic arthritis, chronic recurrent osteomyelitis and inflammatory muscle diseases are included in the subsections below.

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Juvenile Idiopathic Arthritis (PEDMS-10.1)

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Criteria

- Ultrasound (CPT® 76881 or 76882) is considered medically necessary for assessment of: size and characteristics of joint effusions, extent of synovial hypertrophy (which is the hallmark of juvenile idiopathic arthritis), and involvement of tendinous structures.
  - Repeat imaging is considered medically necessary for monitoring treatment or with planned treatment change.
  - MRI of the most symptomatic joint without contrast or without and with contrast is considered medically necessary if ultrasound is inconclusive and MRI findings would alter individual management.
- Distribution of Radiopharmaceutical Agent SPECT (CPT® 78802, or 78803), or SPECT/CT (CPT® 78830), is considered medically necessary for evaluation of facet arthropathy in patients with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis.
- MRI TMJ (CPT® 70336) is considered medically necessary annually for detecting silent TMJ arthritis in children with juvenile idiopathic arthritis (JIA).
- MRI without or without and with of the most involved joint is considered medically necessary to evaluate involved or symptomatic joints in the following situations:
  - when diagnosis is uncertain prior to initiation of drug therapy
  - to study the effects of treatment with disease modifying anti-rheumatic drug (DMARD) therapy
  - to determine a change in treatment
- MRI (with the exception of the annual screening MRI of the TMJ discussed above) is considered not medically necessary for routine follow-up of treatment.

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Chronic Recurrent Multifocal Osteomyelitis (PEDMS-10.2)

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Chronic recurrent multifocal osteomyelitis (CRMO) is a rare autoimmune disease affecting multiple bones, arising most commonly during the second decade of life. Treatment consists of anti-inflammatory and immunomodulatory therapies, and is directed predominantly by status of clinical symptoms (most commonly pain).

Criteria

- The following imaging is considered medically necessary for individuals with CRMO for evaluation of new or worsening pain, or response to treatment in individuals without complete clinical resolution of pain symptoms, when plain x-rays are non-diagnostic:
  - Bone scan (CPT® codes: 78300, 78305, 78306, 78315) OR
  - SPECT (CPT® codes: 78803, or 78831), OR
  - Nuclear Bone Marrow imaging (CPT® codes: 78102, 78103, or 78104), OR
  - Radiopharmaceutical localization of tumor, inflammatory process, or distribution of radiopharmaceutical agent imaging (CPT® codes: 78800, 78801, 78802, or 78803), OR
  - SPECT/CT (CPT® codes: 78830, or 78832)
  - MRI without contrast of specific painful body areas when plain x-ray and bone scan are insufficient to direct acute individual care decisions.
- Whole-body MRI (CPT® 76498) is considered medically necessary for CRMO in the following situations:
  - Individuals suspected of having CRMO if characteristic MR findings of CRMO would preclude the need for a biopsy.
    - Characteristic finding include multiple lesions most commonly involving the juxtaphyseal/peri-physeal portions of the tibia and femur, the clavicle and thoracolumbar spine.
  - Every 6-12 months in individuals with an established diagnosis of CRMO to monitor treatment or to evaluate for clinically occult but radiographically active lesions.
  - See: **Whole Body MR Imaging (Preface-5.2)** for additional details.

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Inflammatory Muscle Diseases (PEDMS-10.3)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination, and plain x-rays should be performed prior to considering advanced imaging.

Inflammatory Muscle Diseases:

These include but are not limited to dermatomyositis, polymyositis, and sporadic inclusion body myositis. MRI without contrast of a single site is considered medically necessary in these disorders for the following purposes:

- selection of biopsy site
- clinical concern for progression
- treatment monitoring
- detection of occult malignancy

Juvenile Dermatomyositis:

Contrary to adult dermatomyositis, juvenile dermatomyositis is very rarely paraneoplastic in nature, and routine screening for occult neoplasm is considered not medically necessary.

The following are considered medically necessary for juvenile dermatomyositis:

- MRI without contrast to confirm the diagnosis and thus avoid a biopsy.
- CT without contrast (CPT® 73700) or MRI (CPT® 73718) to follow progressive calcification in muscles
  - Both CT and MRI are rarely indicated concurrently.
- CT Chest (CPT® 71260) and Abdomen and Pelvis (CPT® 74177) with contrast for individuals with palpable lymphadenopathy or hepatosplenomegaly.

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Evidence Discussion (PEDMS-10)

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Imaging plays a critical role in the evaluation and management of pediatric inflammatory musculoskeletal diseases. Initial radiographs, along with a detailed history and physical examination, can help determine what advanced imaging may be needed. Guidelines recommend that imaging strategies be tailored to the clinical scenario to optimize diagnostic accuracy and safety (Chauvin & Doria, 2017; Roderick et al., 2016).

MRI and ultrasound (US) are recommended as first-line advanced imaging for juvenile idiopathic arthritis (JIA). US has been shown to be instrumental in detecting joint effusion and is recommended for the early detection synovial inflammation (Chauvin & Doria, 2017; Quesada-Masachs et al., 2024). MRI, with sensitivity exceeding 90% in JIA, is recommended when US is inconclusive as it can provide comprehensive assessment of joint inflammation, bone marrow edema, and cartilage damage (Malattia et al., 2020; Sudoł-Szopińska et al., 2022). CT and scintigraphy are rarely recommended due to radiation exposure, but may be necessary in limited or atypical cases (Chauvin & Doria, 2017).

Both bone scintigraphy and MRI are recommended for the diagnostic imaging of chronic recurrent multifocal osteomyelitis (CRMO). Scintigraphy can be helpful in the assessment of new or worsening pain and evaluating the response to treatments (Villani et al., 2015). However, it has been shown to have lower sensitivity and specificity compared to MRI (Villani et al., 2015). With sensitivity over 90% for lesion detection, whole-body MRI is recommended as the superior modality for detecting multifocal bone lesions and monitoring disease activity (Andronikou et al., 2020; Arnoldi et al., 2017; Nico et al., 2022; Roderick et al., 2016; Villani et al., 2015. Additionally, MRI avoids ionizing radiation, making it safer for repeated imaging compared to CT or bone scans (Andronikou et al., 2020).

MRI is also the recommended imaging modality to confirm diagnosis for juvenile muscle disease (e.g., dermatomyositis, polymyositis, inclusion body myositis). MRI is more sensitive to deep muscle edema and changes than US and may help to avoid unnecessary biopsy (Sudoł-Szopińska et al., 2022; Quesada-Masachs et al., 2024). CT is not typically recommended for general diagnosis as it has limited use in soft tissue visualization and to avoid radiation exposure (Chauvin & Doria, 2017). However, CT may be helpful in the assessment of muscle calcification or enlargement of abdominopelvic organs and/or lymph nodes.

Special consideration of potential risks to the individual from imaging must be made, especially in cases where monitoring through repeat images over time will be needed (Andronikou et al., 2020). CT and bone scans involve ionizing radiation which can be harmful and should be avoided when possible (Andronikou et al., 2020; Chauvin & Doria, 2017). While MRI does not expose an individual to radiation, younger individuals

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may require sedation for clear images to be obtained which can pose risks such respiratory depression (Malattia et al., 2020; Voit et al., 2015). There are also risks of allergic reactions to IV contrast. Additional consideration should be given to those with limited access to advanced imaging. Rural and limited resource areas may not provide easy access to the most appropriate imaging modality (Rosendahl & Maas, 2018). Alternatives may be recommended to avoid delays in appropriate care.

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Muscle/Tendon Unit Injuries (PEDMS-11)

Guideline

Muscle/Tendon Unit Injuries (PEDMS-11)

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Muscle/Tendon Unit Injuries (PEDMS-11)

MSP.MI.0011.A

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- Muscle and tendon unit injury imaging indications in pediatric individuals are identical to those in the general imaging guidelines. Please use: **Muscle and Tendon Injuries (MS-11.0)** in the Musculoskeletal Imaging Guidelines.

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Osgood-Schlatter Disease (PEDMS-12)

Guideline

Osgood-Schlatter Disease (PEDMS-12)
Evidence Discussion (PEDMS-12)
References (PEDMS-12)

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Osgood-Schlatter Disease (PEDMS-12)

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Criteria

- Diagnosis is by clinical examination and x-ray, and treatment is conservative.
- Advanced imaging is considered not medically necessary for diagnosis of this disorder.

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Evidence Discussion (PEDMS-12)

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Osgood-Schlatter disease is a self-limiting condition that is secondary to repetitive stress of the knee extensor mechanism. It is defined as traction apophysitis of the tibial tubercle in skeletally immature individuals. It is recommended that clinical exam, history and x-rays are sufficient for diagnosis with high accuracy. Advanced imaging adds little diagnostic benefit, unnecessarily increases healthcare costs, and is generally not recommended (Fox et al., 2018; Hart et al., 2018; Kaneshiro, 2018; Sarkissian & Lawrence, 2020).

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Popliteal (Baker) Cyst (PEDMS-13)

Guideline

Popliteal (Baker) Cyst (PEDMS-13)
Evidence Discussion (PEDMS-13)
References (PEDMS-13)

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Popliteal (Baker) Cyst (PEDMS-13)

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Criteria

Popliteal or Baker cyst in children is a different clinical entity than in adults and is almost never due to intra-articular pathology. These lesions are usually treated conservatively and rarely require surgery.

- Ultrasound (CPT® 76881 or 76882) is the medically necessary initial imaging study.
- MRI without contrast (CPT® 73721) is considered medically necessary for preoperative planning or if ultrasound is non-diagnostic.

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Evidence Discussion (PEDMS-13)

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Ultrasound is recommended as a first-line imaging modality for Baker's cyst detection. High accuracy has been reported with sensitivity ranging from 94% to 97% and specificity approaching 100% compared with MRI in pediatric and adult populations. Ultrasound offers practical advantages including portability, low cost, rapid acquisition, and absence of ionizing radiation, making it particularly suitable for children. Ultrasound is also well suited for follow-up of known Baker's cysts and for screening in clinical or population settings due to its accessibility and strong diagnostic performance (Fox et al., 2018; Liu et al., 2022).

For children aged 5 years and older presenting with chronic knee pain, the American College of Radiology (ACR) recommends that when initial imaging is non-diagnostic, MRI without contrast is usually appropriate for comprehensive evaluation of intra-articular structures. MRI and ultrasound generally provide concordant information on cyst presence, but MRI adds detail on associated meniscal or cartilage pathology when clinically relevant. Additional details from MRI may be necessary for preoperative planning. Sedation may be necessary for MRI in younger children due to longer acquisition times and the need for stillness, which may involve risk of complications such as respiratory depression (Fox et al., 2018; Liu et al., 2022).

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Slipped Capital Femoral Epiphysis (SCFE) (PEDMS-14)

Guideline

Slipped Capital Femoral Epiphysis (SCFE) (PEDMS-14)
Evidence Discussion (PEDMS-14)
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Slipped Capital Femoral Epiphysis (SCFE) (PEDMS-14)

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Criteria

Imaging studies:

- Anteroposterior and lateral x-rays (frog leg or cross table lateral) of both hips will confirm or exclude the diagnosis.
  - If clinical suspicion remains after negative plain films, MRI without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is considered medically necessary to detect widening of the physis before the femoral head is displaced (pre-slip).
- Because a significant percentage of SCFE is bilateral at presentation, it is considered medically necessary to evaluate the contralateral hip if requested, as some surgeons advocate surgical treatment of pre-slip.
- If MRI was not completed for diagnosis, MRI without contrast (CPT® 73721) is considered medically necessary for preoperative planning.

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Evidence Discussion (PEDMS-14)

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Slipped Capital Femoral Epiphysis may be considered in children and adolescents, typically 8 to 15 years of age, presenting with limp, hip/groin/thigh pain, or isolated knee pain. Delayed recognition may worsen prognosis through slip progression, deformity, avascular necrosis (AVN), chondrolysis, femoroacetabular impingement, and early degenerative arthritis (Sankar et al., 2020; Peck, 2017; Hesper et al., 2017; De Angelis et al., 2024). X-ray of both hips is recommended as the initial imaging including anteroposterior and lateral frog leg views for clinically stable SCFE, and anteroposterior and lateral cross table views when unstable SCFE is suspected as frog-leg positioning may worsen pain and potentially affect slip severity in acute unstable slips (Peck, 2017; Hesper et al., 2017; Karout & Naffaa, 2022). Bilateral involvement is frequent and contralateral sequential slip may occur within the first 18 months after unilateral presentation (Peck, 2017; Hesper et al., 2017; De Angelis et al., 2024).

MRI is the recommended advanced imaging test when clinical suspicion remains high despite normal or equivocal radiographs because it is more sensitive than conventional radiography in early SCFE and can depict physeal widening, bone marrow edema, joint effusion, and synovitis before overt epiphyseal displacement is visible. MRI evidence of imminent or early SCFE may support urgent stabilization before further slippage; however, MRI should be used selectively so that imaging does not delay treatment when clinical and radiographic findings are already sufficient. MRI avoids ionizing radiation and is preferred for occult early SCFE, marrow edema, synovitis/effusion, vascularity, and cartilage/soft tissue evaluation, but MRI can be limited by cost, availability, longer scan time, motion, and possible need for sedation in younger or developmentally unable children (Hesper et al., 2017; Karout & Naffaa, 2022; De Angelis et al., 2024). MRI may be useful in acute/unstable SCFE to evaluate pre-existing femoral head vascularity or early AVN when results would alter management, but postoperative MRI can be limited by metallic fixation artifact (Hesper et al., 2017; Sucato, 2018). However, sedation/ anesthesia for pediatric MRI introduces safety considerations, including reduced ability to breathe independently under general anesthesia and potential need for airway support (Bang et al., 2024).

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Limb Length Discrepancy (PEDMS-15)

Guideline

Limb Length Discrepancy (PEDMS-15)

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Limb Length Discrepancy (PEDMS-15)

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- Limb length discrepancy imaging indications in pediatric individuals are identical to those in the general imaging guidelines. Please use: **Limb Length Discrepancy (MS-17.0)** in the Musculoskeletal Imaging Guidelines.

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Congenital Anomalies of the Foot and Lower Extremity (PEDMS-16)

Guideline

Tarsal Coalition (Calcaneonavicular Bar/Rigid Flat Foot) (PEDMS-16.1)
Club Foot (PEDMS-16.2)
Vertical Talus (PEDMS-16.3)
Femoral Anteversion and Tibial Torsion (PEDMS-16.4)
Evidence Discussion (PEDMS-16)
References (PEDMS-16)

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Tarsal Coalition (Calcaneonavicular Bar/ Rigid Flat Foot) (PEDMS-16.1)

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Criteria

- Plain x-rays should be performed initially since the calcaneonavicular bar is readily visible in individuals where ossification has started or is complete.
  - Talocalcaneal coalition is more difficult to evaluate on plain x-rays.
- CT without contrast (CPT® 73700) or MRI without contrast (CPT® 73718) is considered medically necessary if tarsal coalition is suspected (because of restricted hindfoot motion on physical exam), and plain x-rays are inconclusive.

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Club Foot (PEDMS-16.2)

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Criteria

Immediate diagnosis and specialty evaluation in the first week of life provide the best chance for successful correction.

- Plain x-rays should be performed initially since the anomaly is readily visible in individuals where ossification has started or is complete.
- Ultrasound (CPT® 76881 or 76882) is considered medically necessary to characterize the cartilaginous tarsal bones and demonstrate tarsal bone alignment in infants with non-ossified tarsal bones.
- MRI (CPT® 73718) or CT (CPT® 73700) is considered medically necessary to determine residual deficits following repair.
  - Ultrasound is not required prior to MRI or CT if those studies are appropriate.

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Vertical Talus (PEDMS-16.3)

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Criteria

- Plain x-rays should be performed initially since the anomaly is readily visible in individuals where ossification has started or is complete.
- MRI (CPT® 73718) or CT (CPT® 73700) are considered medically necessary to determine residual deficits following repair.

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Femoral Anteversion and Tibial Torsion (PEDMS-16.4)

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Criteria

- Femoral anteversion is a rotational deformity of the femur, which may lead to an in-toeing gait.
- Tibial torsion is a rotational deformity of the tibia that may lead to in-toeing or out-toeing gait, and can be associated with the foot deformities already discussed in **Tarsal Coalition (Calcaneonavicular Bar/Rigid Flat Foot) (PEDMS-16.1)**, **Club Foot (PEDMS-16.2)**, and **Vertical Talus (PEDMS-16.3)**.
- Both deformities are typically diagnosed on clinical examination, but CT Lower Extremity without contrast (CPT® 73700) OR MRI Lower Extremity without contrast (CPT® 73718) is considered medically necessary for preoperative evaluation.

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Evidence Discussion (PEDMS-16)

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Radiographs are recommended as first-line imaging for most pediatric foot and lower extremity deformities to assess osseous alignment. However, they can have reduced sensitivity in non-ossified cartilage and early disease. Ultrasound can be a radiation-free imaging option useful in infants and young children where their bones have not yet ossified for conditions such as clubfoot and vertical talus (Hammer et al., 2019; Wise et al., 2020; Miron & Grimard, 2016; Waelti et al., 2022). Advanced imaging (MRI or CT) is typically reserved for complex, atypical, or pre-surgical planning cases after initial imaging (Denning, 2016; Machida et al., 2017; Wise et al., 2020; Winell & Davidson, 2020a, 2020b).

MRI provides high sensitivity for detecting soft tissue, cartilaginous abnormalities, and bone marrow changes of the foot and lower extremity (Wise et al., 2020; Denning, 2016). MRI is preferred when radiation avoidance is prioritized or when detailed soft tissue characterization is required (Wise et al., 2020; Hesham et al., 2017). MRI is equivalent to CT in accuracy and reproducibility for femoral version measurement in pediatric patients, without ionizing radiation (Hesham et al., 2017).

CT provides superior osseous detail and is considered the reference standard for defining complex bony anatomy such as tarsal coalition and rotational deformities (Wise et al., 2020; Denning, 2016). CT has high diagnostic accuracy for torsional measurements of the lower extremities, traditionally considered the gold standard (Waelti et al., 2022). Ultra-low-dose CT protocols significantly reduce radiation exposure while maintaining diagnostic performance in children (Waelti et al., 2022).

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Procedure Codes Associated with Pediatric Musculoskeletal Imaging (PEDMS)

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Procedure Codes Associated with Musculoskeletal Imaging (PEDMS)

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MRI	CPT®
MRI Upper Extremity non-joint without contrast	73218
MRI Upper Extremity non-joint with contrast (rarely used)	73219
MRI Upper Extremity non-joint without and with contrast	73220
MRI Upper Extremity joint without contrast	73221
MRI Upper Extremity joint with contrast (rarely used)	73222
MRI Upper Extremity joint without and with contrast	73223
MRI Lower Extremity non-joint without contrast	73718
MRI Lower Extremity non-joint with contrast (rarely used)	73719
MRI Lower Extremity non-joint without and with contrast	73720
MRI Lower Extremity joint without contrast	73721
MRI Lower Extremity joint with contrast (rarely used)	73722
MRI Lower Extremity joint without and with contrast	73723
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Upper Extremity	73225
MRA Lower Extremity	73725

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CT	CPT®
CT Upper Extremity without contrast	73200
CT Upper Extremity with contrast	73201
CT Upper Extremity without and with contrast	73202
CT Lower Extremity without contrast	73700
CT Lower Extremity with contrast	73701
CT Lower Extremity without and with contrast	73702
CT Chest without contrast	71250
CT Chest with contrast	71260
CT Abdomen with contrast	74160
CT Pelvis with contrast	72193
CT Abdomen and Pelvis with contrast	74177
Bone Mineral Density CT, one or more sites, axial skeleton	77078
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT®
CTA Upper Extremity	73206
CTA Lower Extremity	73706

Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812

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Nuclear Medicine	CPT®
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Bone Marrow Imaging Limited Areas	78102
Bone Marrow Imaging Multiple Areas	78103
Bone Marrow Imaging Whole Body	78104
Nuclear Bone Scan Limited	78300
Nuclear Bone Scan Multiple Areas	78305
Nuclear Bone Scan Whole Body	78306
Bone Scan Three Phase	78315
DEXA Bone Densitometry, axial skeleton	77080
DEXA Bone Densitometry, peripheral skeleton	77081
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging	78800
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days	78801

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Nuclear Medicine	CPT®
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging	78802
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (eg, head, neck, chest, pelvis), single day imaging	78803
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging	78830
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78831
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (eg, pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78832

Ultrasound	CPT®
Ultrasound, extremity, nonvascular; complete joint	76881
Ultrasound, extremity, nonvascular; limited, anatomic specific for focal abnormality	76882

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Ultrasound	CPT®
Ultrasound, infant hips; dynamic (requiring physician manipulation)	76885
Ultrasound, infant hips; limited, static (not requiring physician manipulation)	76886
Ultrasound, axilla	76882
Ultrasound, upper back	76604
Ultrasound, lower back	76705
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Limited bilateral noninvasive physiologic studies of upper or lower extremity arteries	93922
Complete bilateral noninvasive physiologic studies of upper or lower extremity arteries	93923
Duplex scan of upper extremity arteries or arterial bypass grafts; complete bilateral	93930
Duplex scan of upper extremity arteries or arterial bypass grafts; unilateral or limited	93931
Duplex scan of extremity veins including responses to compression and other maneuvers; complete bilateral study	93970
Duplex scan of extremity veins including responses to compression and other maneuvers; unilateral or limited study	93971
Duplex scan of hemodialysis access (including arterial inflow, body of access and venous outflow)	93990

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General Guidelines (PEDNECK-1)

Guideline

General Guidelines (PEDNECK-1.0)
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General Guidelines (PEDNECK-1.0)

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Criteria

- A pertinent clinical evaluation (including a detailed history, physical examination, and appropriate laboratory studies) should be performed following the onset or change in symptoms and prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled follow-up imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the neck is considered not medically necessary. Advanced imaging of the neck is only considered medically necessary in individuals who have documented active clinical signs or symptoms of disease involving the neck.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the neck are considered not medically necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Age Considerations (PEDNECK-1.1)

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- Many conditions affecting the neck in the pediatric population have different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals who are 19 years old or younger should be imaged according to the Pediatric Neck Imaging Guidelines. Any conditions not specifically discussed in the Pediatric Neck Imaging Guidelines should be imaged according to the General Neck Imaging Guidelines. Individuals who are 19 years of age or older should be imaged according to the General Neck Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Modality General Considerations (PEDNECK-1.3)

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Criteria

- MRI
  - MRI Orbit/Face/Neck is generally performed without and with contrast (CPT® 70543) unless the individual has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize individual movement, sedation is usually required for almost all infants (except neonates) and young children (age above <7 years) as well as older children with developmental delays. Sedation may be administered by oral, intravenous, and/or inhalational routes. In order to limit sedation time in this subdivision of pediatric individuals, the following should be considered:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access is medically necessary for sedation and there is no contraindication for using contrast, imaging without and with contrast may avoid repeating a study with sedation to perform an MRI with contrast if the initial study without contrast is inconclusive.
      - Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If studies of multiple body areas are considered medically necessary by these clinical guidelines for the clinical condition being evaluated, MRI studies of all necessary body areas should be obtained concurrently in the same sedation session.
  - The presence of surgical hardware or implanted devices may preclude the use of MRI.
  - Coordination between provider and the imaging service can result in providing the best choice of radiologic studies for the pediatric individual.

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- CT
  - CT Neck typically extends from the base of the skull to the upper thorax.
    - A separate CPT® code for head imaging in order to visualize the skull base is considered not medically necessary.
    - In some cases, especially in follow-up of a known finding, it is considered medically necessary to limit the exam to the region of concern to reduce radiation exposure.
  - CT Neck is generally performed with contrast (CPT® 70491) unless the individual has a documented contraindication to CT contrast or otherwise stated in a specific guideline section.
  - CT Neck may be considered medically necessary for further evaluation of abnormalities suggested on prior US or MRI Procedures.
  - In general, CT Neck is considered medically necessary when evaluating trauma, malignancy, and for preoperative planning.
  - CTA Neck (CPT® 70498) is considered medically necessary for evaluation of the vessels of the neck, especially with concern for dissection.
  - CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
  - Coordination between the provider and the imaging service can result in the best choice of radiologic studies for the pediatric individual.
- Ultrasound
  - Ultrasound soft tissues of the neck (CPT® 76536) is considered medically necessary as an initial study for evaluating thyroid, parathyroid, parotid and other salivary gland lesions. Ultrasound is also used to further characterize adenopathy, palpable superficial masses, or swelling.
  - For those individuals who do require additional advanced imaging after ultrasound, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the pediatric individual.
- Nuclear Medicine
  - Nuclear medicine studies of the neck in pediatric individuals are most commonly used to evaluate neck masses, or thyroid and parathyroid disease following initial studies with anatomic imaging, such as ultrasound, CT, or MRI. See **Neck Masses (Pediatric) (PEDNECK-2.1)** and **Thyroid and Parathyroid (PEDNECK-6)** for imaging guidelines.
  - Evaluation of salivary gland function in individuals with dry mouth (xerostomia) and **ONE** of the following:
    - Sjögren syndrome **OR**
    - Sialadenitis **OR**

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        - History of head or neck radiation therapy, one of the following is considered medically necessary:
            - Salivary Gland Nuclear Imaging (CPT® 78230) **OR**
            - Salivary Gland Nuclear Imaging with Serial Imaging (CPT® 78231) **OR**
            - Salivary Gland Function Study (CPT® 78232)
- 3D Rendering
    - 3D Rendering indications in pediatric neck imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

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Neck Masses (Pediatric) (PEDNECK-2)

Guideline

Neck Masses (Pediatric) (PEDNECK-2.1)
References (PEDNECK-2)

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Neck Masses (Pediatric) (PEDNECK-2.1)

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Criteria

- Evaluation of neck masses in pediatric individuals involves careful consideration of clinical history and accurate physical examination. The individual's age and knowledge of the anatomy and common lesions of the neck are very important in narrowing the differential diagnosis.
- Congenital lesions (vascular lesions, thyroglossal duct cysts, branchial cleft cysts, teratomas, dermoids, and thymic cysts) and lymphadenopathy account for nearly all benign neck lesions. Primary malignant tumors in children are usually neuroblastoma, lymphoma, or rhabdomyosarcoma.
- Initial imaging of choice:
  - Ultrasound Neck (CPT® 76536)
    - Color Doppler ultrasound bilateral study of carotid arteries (CPT® 93880) **OR** Duplex unilateral study (CPT® 93882) is medically necessary to evaluate the vasculature.
- For inconclusive ultrasound or to further delineate abnormalities on ultrasound:
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)
- For concern for malignancy:
  - Ultrasound Neck is not considered medically necessary prior to imaging.
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)
- For lymphadenopathy persisting for more than 4 weeks of treatment **OR** suspicion of complications such as abscess formation:
  - Ultrasound Neck (CPT® 76536) is considered medically necessary. See **Cervical Lymphadenopathy (PEDNECK-3.1)**.
- Congenital cervical cysts:
  - Ultrasound Neck (CPT® 76536) is considered medically necessary for suspected cystic neck mass.
- Congenital cervical sinus, fistula, cyst, or for preoperative planning:
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)

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    - For fourth branchial cleft cyst/sinus/fistula- barium swallow is considered medically necessary in addition to the above conventional imaging.
- Salivary gland nuclear imaging: **ONE** of the following is considered medically necessary for evaluation of parotid masses to allow preoperative diagnosis of Warthin's tumor:
    - Salivary Gland Nuclear Imaging (CPT® 78230) **OR**
    - Salivary Gland Nuclear Imaging with Serial Imaging (CPT® 78231) **OR**
    - Salivary Gland Function Study (CPT® 78232)
- Ranula (a cystic structure on the floor of the mouth):
    - CT Neck with contrast (CPT®70491) **OR**
    - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary, especially when there is concern for a "plunging" ranula (lesion extending into the submandibular space).

Differential Diagnosis of Neck Lesions by Anatomic Region:

- Subcutaneous tissues:
    - Teratoma (includes dermoid cysts)
        - Cervical teratomas are typically large bulky masses discovered at birth or in the first year of life.
        - Large lesions may cause stridor, dyspnea, or dysphagia.
        - Most teratomas arise in the anterior suprahyoid neck and may be midline or off midline in location and adjacent to or within a thyroid lobe.
    - Vascular lesions
    - Lipoma
    - Cellulitis
    - Plexiform neurofibromas
    - Keloid
    - Scar
    - Pilomatrixoma
    - Subcutaneous fat fibrosis (in neonates)
- Retropharyngeal space:
    - Abscess, cellulitis, adenitis
        - Usually involves children under age 6.
        - Individuals have history of upper respiratory tract infection followed by high fever, dysphagia, and neck pain.
    - Lymphadenopathy
    - Extension of goiter
    - Extension of pharyngeal tumor
- Retrovisceral space (posterior to the cervical esophagus):

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- Gastrointestinal duplication cysts (usually are diagnosed in first year of life).

- Pretracheal space (contains trachea, larynx, cervical esophagus, recurrent laryngeal nerves, and thyroid and parathyroid glands):
  - Thyroglossal duct cyst
    - Thyroglossal duct cyst most commonly presents before the age of 20; 75% present as a midline mass and 43% of individuals present with an infected mass.
    - Usually presents as an enlarging, painless midline mass.
    - Thyroid carcinoma occurs in 1% of thyroglossal duct cysts.
  - Goiter
  - Laryngocele
  - Lymphadenopathy
  - Teratoma
  - Abscess
  - Ectopic thymus or cervical extension of normal thymus
- Danger space (closed space lying between the skull base and the posterior mediastinum and between the alar and prevertebral fasciae in a sagittal plane):
  - Cellulitis
  - Abscess
- Prevertebral space:
  - Neurenteric cyst
  - Cellulitis
  - Abscess
  - Spondylodiskitis
  - Lymphadenopathy
  - Paraganglioma
- Carotid sheath space:
  - Jugular vein thrombosis or phlebitis
  - Lymphadenopathy
  - Cellulitis
  - Abscess
  - Paraganglioma
- Parotid gland space:
  - Parotid lymphadenopathy
  - Retromandibular vein thrombosis
  - Parotiditis
  - Sialodochitis (inflammation of the salivary gland duct)
  - Salivary duct stone
  - Abscess

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- Submandibular and sublingual spaces:
  - Cellulitis
  - Abscess
  - Sialadenitis
  - Thyroglossal duct cyst
  - Branchial cleft cyst
    - 90% of branchial abnormalities arise from the second branchial apparatus.
    - Second branchial cleft cysts are the most common branchial cleft cyst and usually present in individuals between 10 and 40 years as painless fluctuant masses.
    - They typically present as slowly growing, non-tender masses in the upper neck.
    - Most second branchial cleft cysts are located in the submandibular space, at the anteromedial border of the sternocleidomastoid muscle, lateral to the carotid space, or posterior to the submandibular gland.
    - Ranula – typically cystic masses in the floor of the mouth
- Masticator space (includes masseter and pterygoid muscles):
  - Venous or lymphatic malformation
  - Cellulitis
  - Abscess
  - Rhabdomyosarcoma
- Parapharyngeal space:
  - Cellulitis
  - Abscess
  - Neurogenic tumors (CN V, IX, XI and XII)
  - Paragangliomas
  - Neurofibromas
  - Lymphoma
  - Rhabdomyosarcoma
- Paravertebral space:
  - Cervical dermal sinus (epithelium lined dural tubes that connect the skin with the central nervous system or its covering)
  - Meningocele
  - Rhabdomyosarcoma
  - Lymphoma
  - Neuroblastoma
  - Neurofibroma
- Posterior cervical space:
  - Lymphadenopathy
  - Lymphatic malformation

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Congenital Neck Masses:

- Anterior neck masses
  - Branchial anomolies
    - Sinus: with either an internal (to the pharynx) or external (to the skin) opening
    - Fistula: with both an internal and external opening
    - Cyst: closed sac with no openings
  - First branchial anomalies
    - Typically sinus or cyst
    - Located anywhere from the external auditory canal to the region of the parotid gland, down to the level of the hyoid; may communicate with the preauricular soft tissue/parotid, parapharyngeal space or anterior triangle of the neck
      - Type I tract parallels the external auditory meatus.
      - Type II tract courses over the angle of mandible through the parotid ending near/within the external auditory canal bony cartilaginous junction.
  - Second branchial anomalies
    - The most common
    - Located from anterior neck in the region of the middle to lower two thirds of the sternocleidomastoid and the great vessels to the pharyngeal mucosa (tonsil)- a tract and/or cyst may occur anywhere along this path
  - Third branchial anomalies
    - Typically located from the low anterior neck to the base of the pyriform sinus
  - Fourth branchial anomalies
    - Potential tract from the low anterior neck to the thyroid gland or mediastinum
  - Cervical thymus
    - Ectopic thymic remnants can be found in the anterior neck (left more commonly than right) and extend deep (near the carotid sheath)- can connect to mediastinum or have cystic components.
- Midline
  - Ectopic Thyroid/Thyroglossal Duct Cysts
    - Anywhere from the tongue base to the mediastinum (a result of the normal embryologic pathway of the thyroid that fails to obliterate or reach its normal location in the lower neck)
- Just off the midline
  - Thyroid/Thyroglossal Duct Cysts (cysts below the hyoid bone may be lateral to the midline in position)
    - Laryngocele
      - An abnormal dilation of the saccule of the larynx
        - Internal: within the thyroid cartilage
        - External: beyond the thyrohyoid membrane into the neck

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- Anywhere within the neck
  - Teratomas
    - Tissue from all three germ cell layers (ectodermal, mesodermal and endodermal components) typically present as a firm mass, can have calcifications seen on imaging
  - Dermoid cysts
    - Cysts with ectodermal and mesodermal structures (commonly lined by epidermis and containing epidermal appendages) typically in the midline/ submental region, but can be anywhere in the head and neck including orbit
  - Epidermoid cysts
    - Cysts with only ectodermal components (with squamous material)
  - Pilomatixoma
    - Lesion derived from hair matrix/follicles
  - Vascular anomalies
    - Hemangiomas (most common)
      - Congenital: present at birth typically involute
      - Infantile: noted to have a rapid/proliferative phase followed by involution
    - High flow
      - Arteriovenous malformations (AVM) and arteriovenous fistulas (AVF) tangle of vessels
    - Low flow
      - Venous lymphatic and capillary malformations
  - Lymphatic malformations (lymphangiomas)
    - Result from a failure of lymph spaces to connect to the rest of the lymphatic system
      - Macrocystic: comprised of large cysts
      - Microcystic: comprised of smaller cysts typically more infiltrative, lending to difficult excision

Evidence Discussion

- Ultrasound, although operator dependent, is utilized for the initial evaluation of pediatric neck masses, secondary to its availability, expense, lack of radiation, and avoidance of sedation (Ho, 2022). Ultrasound is limited by poor depth of penetration when evaluating deeper abnormalities (Brown & Harave, 2016).
- Contrast enhanced CT is easily accessible and available; however, it exposes the individual to ionizing radiation (Ho, 2022).
- MRI provides excellent soft tissue detail without radiation; however, due to the time needed for complete imaging, anesthesia or sedation may be required(Ho,2022). Children under 6 years of age, children with developmental delays, or children with

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anxiety/claustrophobia may require deep sedation in order to successfully perform a complete radiologic study(Jung, 2020).

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Cervical Lymphadenopathy (PEDNECK-3)

Guideline

Imaging (PEDNECK-3.1)
References (PEDNECK-3)

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Imaging (PEDNECK-3.1)

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Criteria

- Painful acute lymphadenopathy and other painful neck masses (including neck "swelling") should be treated with a trial of conservative therapy for at least 4 weeks, including antibiotics if appropriate.
  - If there is improvement with conservative treatment, advanced imaging is considered not medically necessary.
  - Ultrasound (CPT® 76536) is considered medically necessary for any of the following:
    - Initial evaluation of persistent lymphadenopathy following 4-weeks of treatment/ observation **OR**
    - Unexplained fever (temperature ≥100.4°F) and there is clinical concern for suppurative lymphadenopathy/neck abscess
- For inconclusive ultrasound/to further characterize abnormalities found on ultrasound:
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)
- If systemic symptoms or other clinical findings suggest malignancy, see **Pediatric Lymphomas (PEDONC-5)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Evidence Discussion

- Ultrasound can be used not only as an initial imaging modality, but also as a tool for serial examinations in cases without pathologic features (Harris et al., 2024).
- Ultrasound has the benefit of being able to be used to serially evaluate the pediatric individual with cervical adenopathy without the need for sedation/anesthesia and without exposure to radiation (Harris et al., 2024).
- Inflammatory lymph nodes from acute lymphadenitis are usually painful, tender, and mobile, frequently associated with upper respiratory infection, pharyngitis or dental infection (Weinstock et al., 2018).
- Both MRI and CT are superior to ultrasound for defining the relationship of an abscess to adjacent structures, particularly the airway, and for detecting posterior cervical, mediastinal and intracranial extension (Chadha et al., 2017; Ho, 2022).
- Both CT and MRI can provide additional information that may assist with surgical planning. CT is low risk, but involves radiation exposure, while MRI does not involve

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radiation, but requires more time to complete the study and possibly sedation(Harris et al., 2024; Vaughn, 2023).

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Dystonia/Torticollis (PEDNECK-4)

Guideline

Dystonia/Torticollis (PEDNECK-4.1)
References (PEDNECK-4)

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Dystonia/Torticollis (PEDNECK-4.1)

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Criteria

Infants under 12 Months of Age (Congenital Muscular Torticollis/Fibromatosis Colli)

- Ultrasound Neck (CPT® 76536) is considered medically necessary as the initial study.
  - If Ultrasound is Positive→ No further imaging is considered medically necessary as the diagnosis is defined.
  - If Ultrasound is Negative or to further evaluate for other structural causes:
    - CT Neck with contrast (CPT® 70491) **OR**
    - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
    - MRI Orbit/Face/Neck without and with contrast (CPT® 70543)

Children and Adults (Acquired Torticollis)

- Initial evaluation with history of trauma, and low suspicion of injury:
  - Plain radiographs of the cervical spine are considered medically necessary
    - To identify fracture or malalignment if plain radiographs are inconclusive or in individuals with a high-risk mechanism of cervical spine injury within the last 3 months (see below**):
      - CT Neck with contrast (CPT® 70491) **AND/OR**
      - CT Cervical Spine without contrast (CPT® 72125) is considered medically necessary.
- In the clinical setting of cervical spine trauma with an associated neurologic deficit:
  - MRI Cervical Spine without contrast (CPT® 72141) is considered medically necessary.
- In the absence of trauma, to identify underlying abscess, bony, muscular, vascular, or neurologic causes, ONE of the following is considered medically necessary:
  - CT Neck with contrast (CPT® 70491), **OR**
  - CT Cervical Spine without contrast (CPT® 72125), **OR**
  - MRI Cervical Spine without contrast (CPT® 72141), **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543), **OR**
  - MRA Neck without and with contrast (CPT® 70549)
    - Positive→ Further advanced imaging is considered not medically necessary if a local cause has been identified.
    - Negative→ MRI Brain without and with contrast (CPT® 70553) is considered medically necessary to exclude CNS cause.

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**High-risk mechanisms of cervical spine injury may include:

- Head trauma and/or maxillofacial trauma
- Pedestrian in a motor vehicle accident
- Fall from above standing height
- Diving accident
- Head-on motor vehicle collision without/with airbag deployment
- Rollover motor vehicle collision
- Ejection from the vehicle in a motor vehicle collision
- High speed of the vehicle at the time of collision
- Not wearing a seatbelt/shoulder harness in a motor vehicle collision
- Individuals with ankylosing spondylitis are at high-risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriparesis/quadriplegia

Evidence Discussion

- Ultrasound is the initial method of evaluation of suspected fibromatosis colli. Ultrasound has a sensitivity of 100% and has the advantages of being readily available as well as avoiding sedation and radiation (Oliveira et al., 2018; Ge et al., 2024).
- Standard x-rays are the initial imaging modality after trauma, but can be technically challenging due to head position (Kadom et al., 2019; Suhr & Oledzka, 2015) .
- Both CT and MRI assist in diagnosing non traumatic torticollis as a result of atlantoaxial subluxation. CT has the advantage of being readily available; however, it exposes the child to radiation, while MRI provides better soft tissue detail such as spinal cord compression, but may require sedation/anesthesia due to the length of the study (Wenger et al., 2021; Kadom et al., 2019).

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Dysphagia (PEDNECK-5)

Guideline

Dysphagia (PEDNECK-5.1)
References (PEDNECK-5)

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Dysphagia (PEDNECK-5.1)

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Criteria

- Dysphagia imaging indications in pediatric individuals are very similar to those for adult individuals. See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)** in the Neck Imaging Guidelines.
- For concern of foreign body ingestion as the etiology of dysphagia initial imaging:
  - X-rays of the neck and chest are considered medically necessary.
- For dysphagia associated with chest pain and difficulty swallowing both solids and liquids or gastroesphageal reflux:
  - Esophageal motility study (CPT® 78258) is considered medically necessary.
- For a suspected anatomical variant such as a vascular ring, right sided aortic arch, or double arch noted on chest radiography (which can be associated with dysphagia):
  - CTA Chest (CPT® 71275) **OR**
  - MRA Chest (CPT® 71555) is considered medically necessary.

Evidence Discussion

- X-rays are medically necessary as the initial evaluation of foreign body ingestion in children. Plain films provide the advantage of being readily available to detect radiopaque foreign bodies or other pathologic findings (Leinwand et al., 2016).
- Chest CT and MRI provide information regarding anatomy and possible external compression resulting in dysphagia, but require the use of contrast and possible sedation (Sommburg et al., 2018; Stagnaro et al., 2017).

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Thyroid and Parathyroid (PEDNECK-6)

Guideline

Thyroid Masses or Nodules (PEDNECK-6.1)
Hyperthyroidism (PEDNECK-6.2)
Hypothyroidism (PEDNECK-6.3)
Parathyroid Imaging (PEDNECK-6.4)
References (PEDNECK-6)

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Thyroid Masses or Nodules (PEDNECK-6.1)

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Criteria

- For the initial study for evaluation of thyroid masses, diffuse thyroid enlargement, or nodules in pediatric individuals:
  - Ultrasound Neck (CPT® 76536) is considered medically necessary.
- **For a normal or elevated TSH** with any solitary or suspicious thyroid nodule noted on imaging or physical exam:
  - Fine needle aspiration (FNA) under ultrasound guidance (CPT® 76942) is considered medically necessary.
- **For a low TSH:**
  - Nuclear thyroid scintigraphy (either CPT® 78013 or CPT® 78014) is considered medically necessary.
    - Hyperfunctioning nodules should be treated surgically but may also undergo FNA under ultrasound guidance (CPT® 76942) if suspicious in appearance and not being treated surgically.
    - Hypofunctioning nodules should undergo FNA under ultrasound guidance (CPT® 76942).
- For lymph node assessment if cervical lymph node imaging was not performed at the time of the initial diagnostic thyroid ultrasound:
  - Repeat imaging with Ultrasound Neck (CPT® 76536) is considered medically necessary.
- For preoperative planning in individuals with large or fixed masses, vocal cord paralysis, or bulky cervical or supraclavicular adenopathy:
  - CT Neck without contrast (CPT® 70490) **OR**
  - CT Neck with contrast (CPT® 70491) **OR**
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is considered medically necessary.
  - In addition, for individuals with substernal extension of the thyroid, pulmonary symptoms or abnormalities on chest x-ray:
    - CT Chest without contrast (CPT® 71250) **OR**
    - CT Chest with contrast (CPT® 71260) is considered medically necessary.
- If any biopsy reveals thyroid carcinoma, See **Thyroid Cancer (ONC-6)** in the Oncology Imaging Guidelines.

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- Repeat ultrasound (CPT® 76536) and/or FNA under ultrasound guidance (CPT® 76942) is considered medically necessary 3-6 months following initial biopsy if the initial biopsy shows inadequate, or non-diagnostic findings.
  - Repeat ultrasound (CPT® 76536) is considered medically necessary in 6-12 months if the nodule is stable and/or FNA is benign.
  - The nodule should be treated surgically if growing or the FNA is not benign.
- Repeat ultrasound (CPT® 76536) is considered medically necessary 6-12 months following initial biopsy if the initial biopsy shows benign findings.
  - Repeat ultrasound (CPT® 76536) is considered medically necessary every 1-2 years if the nodule is stable.
  - Repeat FNA under ultrasound guidance (CPT® 76942) or manage surgically if the nodule is growing or concerning new findings are present.
  - Benign nodules that have been surgically resected do not require routine imaging follow up in the absence of clinical or laboratory changes suggesting recurrence.
- If the initial biopsy shows indeterminate or suspicious findings, surgery is recommended.

Evidence Discussion

- Ultrasound is used as the initial evaluation for thyroid abnormalities and follow up as it is noninvasive, radiation free, inexpensive, very sensitive, and does not require sedation to complete (Iakovou et al., 2020; Chun et al., 2021; Khalatbari et al., 2021; Bilezikian et al., 2022).
- Fine needle biopsy in pediatric thyroid nodules has a sensitivity of 94% and specificity of 100% (Partyka et al., 2016).
- Both CT and MRI can be valuable in preoperative evaluation of thyroid disease for determining involvement of lymph nodes or adjacent structures. However, iodine based contrasts can lead to suppression of radioactive iodine thyroid uptake, thus postponing radioiodine treatment and favoring the use of MRI (Iakovou et al., 2020).

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Hyperthyroidism (PEDNECK-6.2)

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Criteria

- For the initial study for evaluation of hyperthyroidism:
  - Ultrasound Neck (CPT® 76536) is considered medically necessary.
    - If a nodule or mass is discovered on ultrasound, the individual should be imaged according to **Thyroid Masses or Nodules (PEDNECK-6.1)**.
- For all other individuals with documented hyperthyroidism:
  - Thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is considered medically necessary.

Evidence Discussion

- Ultrasound is used as the initial evaluation for thyroid abnormalities and follow up as it is noninvasive, radiation free, inexpensive, very sensitive, and does not require sedation to complete (Iakovou et al., 2020; Chun et al., 2021).
- The use of a radioactive iodine uptake scan (although involves ionizing radiation exposure) is considered medically necessary if the diagnosis is unclear after ultrasound and laboratory evaluation have been completed (Dimachkieh et al., 2019; Silva & Navarro, 2020).

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Hypothyroidism (PEDNECK-6.3)

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Criteria

- For the initial study for evaluation of hypothyroidism:
  - Ultrasound Neck (CPT® 76536) is considered medically necessary.
    - If a nodule or mass is discovered on ultrasound, the individual should be imaged according to **Thyroid Masses or Nodules (PEDNECK-6.1)**.
- For individuals with documented congenital hypothyroidism, thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is considered medically necessary.

Evidence Discussion

- Ultrasound is used as the initial evaluation for thyroid abnormalities and follow up as it is noninvasive, radiation free, inexpensive, very sensitive, and does not require sedation to complete (Iakovou et al., 2020; Chun et al., 2021).
- The use of a radioactive iodine uptake scan (although involves ionizing radiation exposure) is medically necessary if the diagnosis is unclear after ultrasound and laboratory evaluation have been completed (Dimachkieh et al., 2019; Silva & Navarro, 2020).

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Parathyroid Imaging (PEDNECK-6.4)

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- Parathyroid imaging indications in pediatric individuals are the same as those for adult individuals. See **Parathyroid Imaging (Neck-8.3)** in the Neck Imaging Guidelines.

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References (PEDNECK-6)

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Esophagus (PEDNECK-7)

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Esophagus (PEDNECK-7.1)

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Criteria

- Esophagus imaging indications in pediatric individuals are very similar to those for adult individuals. See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)** in the Neck Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - For suspected foreign body ingestion or impaction:
    - Plain x-rays are considered medically necessary for initial imaging.
    - Ultrasound Neck (CPT® 76536) is considered medically necessary for evaluation of upper esophageal foreign bodies.
    - See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)**.
  - For evaluating congenital atresia with associated tracheoesophageal fistula:
    - Esophagram is considered medically necessary.
  - For evaluation of suspected congenital malformations with inconclusive x-rays or esophagram:
    - CT Neck with contrast (CPT® 70491) **AND/OR**
    - CT Chest with contrast (CPT® 71260)
      - 3D rendering (CPT® 76376 or CPT® 76377) is considered medically necessary for preoperative planning in complex cases.
  - Plain radiographs alone usually suffice for the diagnosis of esophageal atresia and a contrast examination of the esophagus is not warranted but may be considered medically necessary for post-operative evaluation.

Evidence Discussion

- The initial evaluation for possible foreign body ingestion is plain x-rays, because of their availability and affordability (Choi et al., 2022; Kvist & Garcia, 2024).
- Esophagram, in the setting of esophageal atresia with tracheoesophageal fistula, allows for diagnosis of the condition through the use of a nasogastric tube being withdrawn while instilling contrast material (Choi et al., 2022).
- Chest x-ray is used as the initial evaluation of the mediastinum when concerns are present for a congenital abnormality because of availability and affordability (Choi et al., 2022). Evaluation of vascular ring or sling includes an esophagram. For further evaluation, CT is favored over MRI secondary to availability, expedited time, and cost (Liszewski et al., 2024; Kapur et al., 2019).

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Esophagus Health Equity Considerations

Health Equity Considerations

- Higher levels of housing instability and material deprivation are associated with esophageal foreign body ingestion and complications (Chen et al., 2024).

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Trachea (PEDNECK-8)

Guideline

Trachea (PEDNECK-8.1)
References (PEDNECK-8)

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Trachea (PEDNECK-8.1)

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Criteria

- Trachea imaging indications in pediatric individuals are similar to those for adult individuals. See **Imaging of the Larynx, Trachea, and Bronchus (Neck-9.1)** in the Neck Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - For evaluation of suspected congenital malformations if x-rays are inconclusive:
    - CT Neck with contrast (CPT® 70491) **AND/OR**
    - CT Chest with contrast (CPT® 71260) are considered medically necessary.
      - If requested, 3D rendering (CPT® 76376 or CPT® 76377) is considered medically necessary for preoperative planning in complex cases.
  - CT Chest (either without contrast CPT® 71250 or with contrast CPT® 71260) is considered medically necessary in complicated cases or when bronchoscopy is being considered.

Evidence Discussion

- Chest x-ray, because of its availability and affordability, is generally regarded as the initial imaging study in evaluating possible foreign body aspiration. Chest x-ray has a sensitivity of 62-88% and a specificity of 30-97% of detecting airway foreign bodies (El Khoury et al., 2024; Sekioka et al., 2021; Truong & Luu, 2023). .
- CT may play a role in diagnosing foreign body aspiration in children with non-specific complaints such as fever and cough. CT of the chest has greater than 92% sensitivity and specificity and a diagnostic accuracy of 98% in detecting airway foreign bodies and can play a role in the individual with an unclear or atypical clinical picture (El Khoury et al., 2024; Azzi et al., 2023; Goodarzy et al., 2024).
- Chest x-ray is used as the initial evaluation of the mediastinum when concerns are present for a congenital abnormality. For further evaluation, CT is favored over MRI secondary to availability, expedited time, and cost (Liszewski et al., 2024).

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Procedure Codes Associated with Neck Imaging

Guideline

Procedure Codes Associated with Neck Imaging

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Procedure Codes Associated with Neck Imaging

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MRI	CPT®
MRI Orbit, Face, Neck without contrast	70540
MRI Orbit, Face, Neck with contrast (rarely used)	70542
MRI Orbit, Face, Neck without and with contrast	70543
MRI Temporomandibular Joint (TMJ)	70336
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Neck without contrast	70547
MRA Neck with contrast	70548
MRA Neck without and with contrast	70549

CT	CPT®
CT Maxillofacial without contrast (includes sinuses, jaw, and mandible)	70486
CT Maxillofacial with contrast (includes sinuses, jaw, and mandible)	70487
CT Maxillofacial without and with contrast (includes sinuses, jaw, and mandible)	70488
CT Neck without contrast (includes jaw, and mandible)	70490

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CT	CPT®
CT Neck with contrast (includes jaw, and mandible)	70491
CT Neck without and with contrast (includes jaw, and mandible)	70492
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT®
CTA Neck	70498

Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Thyroid Uptake, Single or Multiple Quantitative Measurement(s) (Including Stimulation, Suppression, or Discharge, When Performed)	78012
Thyroid Imaging (Including Vascular Flow, When Performed)	78013
Thyroid Imaging (Including Vascular Flow, When Performed); with Single or Multiple Uptake(s) Quantitative Measurement(s) (Including Stimulation, Suppression, or Discharge, When Performed)	78014
Thyroid Carcinoma Metastases Imaging Limited Area	78015

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Nuclear Medicine	CPT®
Thyroid Carcinoma Metastases Imaging with Additional Studies	78016
Thyroid Carcinoma Metastases Imaging Whole Body	78018
Thyroid Carcinoma Metastases Uptake (Add-on Code)	78020
Parathyroid Planar Imaging (Including Subtraction, When Performed)	78070
Parathyroid Planar Imaging (Including Subtraction, When Performed); with Tomographic (SPECT)	78071
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Salivary Gland Nuclear Imaging with Serial Imaging	78231
Salivary Gland Function Study	78232
Esophageal Motility Study	78258
Radiopharmaceutical Localization Imaging Limited area	78800
Radiopharmaceutical Localization Imaging Whole Body	78802
Radiopharmaceutical Localization Imaging SPECT	78803

Ultrasound	CPT®
Soft tissues of head and neck Ultrasound (thyroid, parathyroid, parotid, etc.)	76536
Duplex scan of extracranial arteries; complete bilateral study	93880
Duplex scan of extracranial arteries; unilateral or limited study	93882
Non-invasive physiologic studies of extracranial arteries, complete bilateral study	93875
Ultrasound guidance for needle placement	76942

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General Criteria (PEDONC-1)

Guideline

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Abbreviations for Pediatric and Special Populations Oncology Imaging Guidelines

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Abbreviations for Pediatric and Special Populations Oncology Imaging Guidelines	
AFP	alpha-fetoprotein (tumor marker)
ALCL	anaplastic large cell lymphoma
ALL	acute lymphoblastic leukemia
AML	acute myelogenous leukemia
ß-hCG	human chorionic gonadotropin beta-subunit (tumor marker)
BKL	Burkitt's lymphoma
BWT	bilateral Wilms tumor
CCSK	clear cell sarcoma of the kidney
CNS	central nervous system
COG	Children's Oncology group
CPT®	current procedural terminology; trademark of the American Medical Association
CSF	cerebrospinal fluid
CT	computed tomography
CXR	chest x-ray

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Abbreviations for Pediatric and Special Populations Oncology Imaging Guidelines	
DAWT	diffuse anaplasia Wilms tumor
ESFT	Ewing sarcoma family of tumors
FAWT	focal anaplasia Wilms tumor
FHWT	favorable histology Wilms tumor
HL	Hodgkin lymphoma
HSCT	hematopoietic stem cell transplant (bone marrow or peripheral blood)
HVA	homovanillic acid
LL	lymphoblastic lymphoma
MIBG	metaiodobenzylguanidine (nuclear scan using ^{123}i or ^{131}i)
MPNST	malignant peripheral nerve sheath tumor
MRI	magnetic resonance imaging
NBL	neuroblastoma
NED	no evidence of disease
NHL	non-Hodgkin lymphoma
NPC	nasopharyngeal carcinoma
NRSTS	nonrhabdomyosarcomatous soft tissue sarcomas
OS	osteosarcoma
PET	positron emission tomography
PMBCL	primary mediastinal b-cell lymphoma

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Abbreviations for Pediatric and Special Populations Oncology Imaging Guidelines	
PNET	primitive neuroectodermal tumor
RCC	renal cell carcinoma
RMS	rhabdomyosarcoma
US	ultrasound
VMA	vannilylmandelic acid
WBC	white blood cell count
XRT	radiation therapy

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General Criteria (PEDONC-1.0)

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Criteria

- A relevant clinical evaluation or meaningful contact (telephone call, electronic mail or messaging) should be performed prior to considering advanced imaging, unless the individual is undergoing guideline-supported scheduled off therapy surveillance evaluation or cancer screening. The clinical evaluation may include a relevant history and physical examination, including biopsy, appropriate laboratory studies, and results of non-advanced or advanced imaging modalities.
  - Because of the relatively small number of childhood cancer treatment centers, it is common to combine off-therapy visits with imaging and other sub-specialist visits to accommodate families traveling long distances for their child's care.
- Unless otherwise stated in the disease-specific guideline, a histological confirmation of malignancy (or recurrence) and the stage of disease is required to perform a medical necessity review of the requested imaging.
- Unless otherwise stated in the disease-specific guideline, advanced imaging of asymptomatic individuals is not routinely considered medically necessary without signs or symptoms of systemic involvement of cancer.
- Conventional imaging performed prior to diagnosis should not be repeated unless there is a delay of at least 6 weeks since previous imaging and treatment initiation or there are new or significantly worsening clinical signs or symptoms.
- Generally, the studies listed in the disease-specific sections reflect the studies supported by current literature and research for that condition. If a study is not listed, then it is not considered medically necessary.
- Routine imaging of brain, spine, neck, chest, abdomen, pelvis, bones, or other body areas is not considered medically necessary except where explicitly stated in a diagnosis-specific guideline section, or if one of the following applies:
  - Known prior disease involving the requested body area
  - New or worsening symptoms or physical exam findings involving the requested body area (including non-specific findings such as ascites or pleural effusion)
  - New finding on basic imaging study such as plain x-ray or ultrasound
  - New finding on adjacent body area CT/MRI study (i.e., pleural effusion observed on CT abdomen)
  - Unless otherwise stated in the disease-specific guideline, advanced imaging of asymptomatic individuals is not considered medically necessary without signs or symptoms of systemic involvement of cancer.

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- Repeat imaging studies are not generally considered medically necessary unless there is evidence of disease progression, recurrence of disease, and/or the repeat imaging will affect an individual's clinical management.

- Unless otherwise stated in the diagnosis-specific guidelines, imaging for treatment response is considered medically necessary after every 2 cycles, which is usually ~6 weeks of therapy for solid tumors and usually ~8 to 12 weeks for CNS tumors
- Unless otherwise specified for a specific cancer type, once PET has been documented to be negative for a given individual's cancer or all PET-avid disease has been surgically resected, PET is not considered medically necessary for continued disease monitoring or surveillance unless one of the following applies:
  - Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive or suspicious for recurrence
  - Residual mass that has not changed in size since the last conventional imaging does not justify PET imaging
  - PET avidity in a residual mass at the end of planned therapy is not an indication for PET imaging during surveillance

Clarification of Phases of Therapy

Phases of Oncology Imaging	Definition
Screening	• Imaging requested for individuals at increased risk for a particular cancer in the absence of known clinical signs or symptoms • Screening using advancing imaging is only considered medically necessary for conditions listed in **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)**
Suspected/Initial Staging	• All imaging studies requested from the time cancer is first clinically suspected until the initiation of specific treatment ◦ CT Chest prior to anesthesia for biopsy or resection of solid tumors and CTs of other involved body areas are generally considered medically necessary and should be performed concurrently ◦ Metastatic CNS imaging and nuclear medicine imaging are generally deferred until after a histologic diagnosis is made, unless otherwise indicated by diagnosis-specific guideline

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Phases of Oncology Imaging	Definition
Treatment Response	• Imaging performed during any type of active treatment (chemotherapy or other medications, radiation therapy, or surgery), including evaluation at the end of planned active treatment ◦ Unless otherwise stated in the diagnosis-specific guidelines, imaging for treatment response is considered medically necessary after every 2 cycles, which is usually ~6 weeks of therapy for solid tumors and usually ~8 to 12 weeks for CNS tumors
Surveillance	• Imaging performed in individuals who are asymptomatic or have chronic stable symptoms and not receiving any active treatment, even if residual imaging abnormalities are present ◦ PET imaging is not considered medically necessary for surveillance imaging unless specifically stated elsewhere in the diagnosis-specific guideline sections
Recurrence	• All imaging studies completed at the time a recurrence or progression of a known cancer is strongly suspected or documented based on clinical signs or symptoms, laboratory findings, or results of basic imaging studies such as plain radiography or ultrasound • Following documented recurrence of childhood cancer, any studies recommended for initial staging of that cancer type in the diagnosis-specific imaging guideline section are considered medically necessary ◦ During active treatment for recurrent pediatric cancer, conventional imaging evaluation (CT or MRI, should use the same modality for ongoing monitoring as much as possible) of previously involved areas is considered medically necessary according to the treatment response imaging in the diagnosis-specific guideline section ▪ Always refer to the diagnosis specific guideline for PET indications in recurrence.

Criteria

- Brain imaging is performed for signs or symptoms of brain disease.

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- MRI Brain without and with contrast (CPT® 70553) is the medically necessary study for evaluation of suspected or known brain metastases. If a non-contrast CT head shows suspicious lesion, MRI Brain is considered medically necessary to further characterize the lesion.
- CT Head without and with contrast (CPT® 70470) is considered medically necessary when MRI is contraindicated or not available, or if there is skull bone involvement.
- Certain malignancies including, but not limited to, melanoma, lung cancer, and renal cell cancer have indications for brain imaging for asymptomatic individuals.
- If stage IV disease is demonstrated elsewhere or if systemic disease progression is noted, refer to disease specific guidelines.
- Initiation of angiogenesis therapy is not an indication for advanced imaging of the brain in asymptomatic individuals (Avastin/Bevacizumab; <3% risk of bleeding and <1% risk of serious bleeding).

- Bone Scan:
  - Primarily used for evaluation of bone metastases in individuals with solid malignancies.
  - Indications for bone scan in individuals with history of malignancy include – bone pain, rising tumor markers, elevated alkaline phosphatase, or in individuals with primary bone tumor.
  - For evaluation of suspected or known bony metastases, CPT® 78306 (Nuclear bone scan whole-body) is considered medically necessary.
  - Radiopharmaceutical Localization scan SPECT (CPT® 78803 or CPT® 78831) or SPECT/CT (CPT® 78830 or CPT® 78832) is considered medically necessary as an add-on test for further evaluation of a specific area of interest.
- Bone scan supplemented by plain x-rays are the initial imaging modalities for suspected malignant bone pain. For specific imaging indications, see also:
  - **Nuclear Medicine (NM) Imaging in Oncology (ONC-1.3)**
  - **Bone (Non-Vertebral) Metastases (ONC-31.5)**
  - **Spinal/Vertebral Metastases (ONC-31.6)**
  - **Carcinoma of Unknown Primary Site (ONC-31.7)**
- Delay PET/CT for at least 12 weeks after completion of radiation treatment, unless required sooner for imminent surgical resection.
- PET/CT may be considered medically necessary prior to biopsy in order to determine a more favorable site for biopsy when a prior biopsy was nondiagnostic or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.
- Unless otherwise specified in diagnosis-specific guideline section, PET/CT may be considered medically necessary if:

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- Conventional imaging (CT, MRI, or bone scan) reveals findings that are inconclusive (including signs or symptoms that are highly suspicious for recurrence with no source found on imaging), with continued suspicion for active disease

- **Unless specified in diagnosis-specific guideline section PET/CT Imaging is NOT considered medically necessary for**:
  - Infection, inflammation, trauma, post-operative healing, granulomatous disease, rheumatological conditions
  - Concomitantly with separate diagnostic CT studies
  - Conclusive evidence of distant or diffuse metastatic disease on recent conventional imaging studies
  - Metastatic disease in the central nervous system (CNS)
  - Lesions less than 8mm in size
  - Follow up after localized therapy (i.e., radiofrequency ablation, embolization, stereotactic radiation, etc.)
  - Rare malignancies, due to lack of available evidence regarding the diagnostic accuracy of PET in rare cancers
  - Surveillance
    - Serial monitoring of individuals who are not currently receiving anti-tumor treatment or are receiving maintenance treatment
    - Serial monitoring of FDG avidity until resolution.
    - PET/CT avidity in a residual mass at the end of planned therapy is not an indication for PET/CT imaging during surveillance.
    - Residual mass that has not changed in size since the last conventional imaging does not justify PET imaging
- Please refer to general guidelines section **PET Imaging in Oncology (ONC-1.4)** and **PET Imaging in Pediatric Oncology (PEDONC-1.4)** for further guidance regarding PET. Those guidelines should be applied with regard to radiotracer coverage.
- Please refer to general guidelines in **Unlisted Procedure Codes in Oncology (ONC-1.5)** for unlisted procedures in pediatric oncology.

Clinical Trials

- Similar to investigational and experimental studies, clinical trial imaging requests will be considered to determine whether they meet these evidence-based guidelines.
- Imaging studies which are inconsistent with established clinical standards, or are requested for data collection and not used in direct clinical management are not considered medically necessary.

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Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Age Considerations (PEDONC-1.1)

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- The majority of malignancies occurring in the pediatric population are different diagnoses than those occurring in the adult population.
- For those diseases which occur in both pediatric and adult populations, minor differences may exist in management between pediatric and adult medical oncologists due to the following:
  - Age of the individual
  - Comorbidities
  - Differences in disease natural history between children and adults

AGE APPROPRIATE GUIDELINES	
Age of Individual	**Appropriate Imaging Guidelines**
19 years of age or older at initial diagnosis	• General Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section
Under 19 years of age at initial diagnosis	• Pediatric and Special Populations Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section
15 to 39 years of age at initial diagnosis (defined as Adolescent and Young Adult (AYA) oncology individuals)	• When unique guidelines for a specific cancer type exist only in either Oncology or Pediatric and Special Populations Oncology, AYA individuals should be imaged according to the guideline section for their specific cancer type, regardless of the individual's age • When unique guidelines for a specific cancer type exist in both Oncology and Pediatric and Special Populations Oncology, AYA individuals should be imaged according to the age rule in the previous bullet

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Appropriate Clinical Evaluations (PEDONC-1.2)

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Criteria

- The majority of pediatric oncology imaging indications are listed in the diagnosis-specific guideline sections
  - Rare malignancies and other circumstances not specifically addressed elsewhere in the Pediatric Oncology guidelines, the following general principles apply:
    - Routine imaging of brain, spine, neck, chest, abdomen, pelvis, bones, or other body areas is not considered medically necessary in the absence of:
      - Localizing symptoms or
      - Abnormalities on plain radiography or ultrasound
- The overwhelming majority of pediatric oncology individuals treated in the United States will be enrolled on or treated according to recent Children's Oncology Group (COG) protocols
  - COG is a National Cancer Institute (NCI) supported clinical trials group
  - These imaging guidelines are generally consistent with evaluations recommended by COG protocols commonly used for direct individual care (whether formally enrolled on study or not)
    - Requests for exception to guidelines based on COG protocol should be accompanied by the COG road map or COG details in the medical record for case-by-case consideration.
  - For individuals enrolled in a COG study, imaging recommended by COG protocols is generally considered medically necessary unless the imaging is being performed solely to address a study objective and would not be considered medically necessary in usual clinical care.
    - Requests for exception to guidelines based on COG protocol should be accompanied by the COG road map or COG details in the medical record for case-by-case consideration.

Phases of Pediatric Oncology Imaging:

- Pediatric malignancies, in general, behave more aggressively than adult cancers, and the time from initial suspicion of cancer to specific therapy initiation can be measured in hours to days for most pediatric cancers
- It is recommended that children with pediatric solid tumors undergo CT evaluation of the chest prior to general anesthesia for biopsy or resection due to the risk of post-

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operative atelectasis mimicking pulmonary metastasis resulting in inaccurate staging and/or delay in therapy initiation
- Unlike adult cancers, in most pediatric cancers surveillance does not begin until all planned multi-modal therapy is completed
- Pediatric cancers where surgical resection is considered curative are listed in the diagnosis-specific guideline sections
- Certain tumor types do not require surveillance with advanced imaging as individual outcomes following relapse are not improved by surveillance imaging. See diagnosis-specific guideline sections for details
- Imaging may be considered medically necessary more frequently than recommended by guidelines with clinical documentation that the imaging results are likely to result in a treatment change for the individual, including a change from active treatment to surveillance

Phases of Oncology Imaging	Definition
Screening	• Imaging requested for individuals at increased risk for a particular cancer in the absence of known clinical signs or symptoms • Screening using advancing imaging is only considered medically necessary for conditions listed in **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)**
Suspected/Initial Staging	• All imaging studies requested from the time cancer is first clinically suspected until the initiation of specific treatment ◦ CT Chest prior to anesthesia for biopsy or resection of solid tumors and CTs of other involved body areas are generally considered medically necessary and should be performed concurrently ◦ Metastatic CNS imaging and nuclear medicine imaging are generally deferred until after a histologic diagnosis is made, unless otherwise indicated by diagnosis-specific guideline

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Phases of Oncology Imaging	Definition
Treatment Response	• Imaging performed during any type of active treatment (chemotherapy or other medications, radiation therapy, or surgery), including evaluation at the end of planned active treatment ◦ Unless otherwise stated in the diagnosis-specific guidelines, imaging for treatment response is considered medically necessary after every 2 cycles, which is usually ~6 weeks of therapy for solid tumors and usually ~8 to 12 weeks for CNS tumors
Surveillance	• Imaging performed in individuals who are asymptomatic or have chronic stable symptoms and not receiving any active treatment, even if residual imaging abnormalities are present ◦ PET imaging is not considered medically necessary for surveillance imaging unless specifically stated in elsewhere in the diagnosis-specific guideline sections
Recurrence	• All imaging studies completed at the time a recurrence or progression of a known cancer is strongly suspected or documented based on clinical signs or symptoms, laboratory findings, or results of basic imaging studies such as plain radiography or ultrasound • Following documented recurrence of childhood cancer, any studies recommended for initial staging of that cancer type in the diagnosis-specific imaging guideline section are considered medically necessary ◦ During active treatment for recurrent pediatric cancer, conventional imaging evaluation (CT or MRI, should use the same modality for ongoing monitoring as much as possible) of previously involved areas is considered medically necessary according to the treatment response imaging in the diagnosis-specific guideline section ▪ Always refer to the diagnosis specific guideline for PET indications in recurrence.

Radiation Treatment Planning Criteria In Pediatric Oncology

- Imaging performed in support of radiation therapy treatment planning should follow guidelines outlined in **Unlisted Procedure Codes in Oncology (ONC-1.5)**.

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Cardiac Function Assessment Criteria in Pediatric Oncology During Active Treatment:

Indication	Medically Necessary Imaging Study
• Evaluation of cardiac function prior to cardiotoxic chemotherapy, and for monitoring while on active therapy or at end of therapy at the discretion of the treating pediatric oncologist based on: ◦ Cumulative cardiotoxic therapy received to date ◦ Individual's age and gender ◦ Most recent echocardiogram results ◦ New or worsening cardiac symptoms	• Echocardiography (CPT® 93306, CPT® 93307, or CPT® 93308)
• For either of the following: ◦ Echocardiography yielded a borderline shortening fraction (<30%) and additional left ventricular function data are necessary to make a chemotherapy decision OR ◦ Echocardiography windowing is suboptimal due to body habitus or tumor location	• Multi-gated acquisition (MUGA, CPT® 78472) blood pool nuclear medicine scanning

Immunosuppression Criteria During Pediatric Cancer Therapy and Imaging Ramifications:

- Individuals may be severely immunocompromised during active chemotherapy treatment and any conventional imaging request to evaluate for infectious complications during this time frame is considered medically necessary
  - Imaging requests for infectious disease concerns for all individuals with absolute neutrophil count (ANC) <500 **or**
  - Inconclusive findings on chest x-ray or US at any ANC during active treatment are considered medically necessary as requested
  - Individuals may have therapy-induced hypogammaglobulinemia which requires supplemental intravenous immune globulin (IVIG) during maintenance therapy. These individuals receiving supplemental IVIG should be treated similarly to individuals with ANC <500 with regards to imaging for infectious disease

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- Some individuals are treated with very intensive chemotherapy regimens (including autologous stem cell transplantation) and spend the majority of their chemotherapy treatment phase in the hospital. See: **Hematopoietic Stem Cell Transplantation (HSCT) (PEDONC-20)**.
- Due to the high risk of invasive infections, frequent CT may be considered medically necessary to evaluate known sites of invasive fungal infection, and in general these are considered medically necessary as requested
  - Surveillance imaging of asymptomatic individuals to detect invasive fungal infection has not been shown to impact individual outcomes
    - Imaging requests are considered medically necessary when acute clinical decisions will be made based on the imaging

Hematopoietic Stem Cell Transplant (HSCT) Criteria in Pediatric Oncology:

- Transplantation of hematopoietic stem cells from bone marrow, peripheral blood, or cord blood is commonly used in the following clinical situations:
  - High-risk or recurrent leukemia (allogeneic)
  - Recurrent lymphoma (allogeneic or autologous)
  - Hemophagocytic lymphohistiocytosis (allogeneic)
  - High-risk sickle cell disease (allogeneic)
  - High-risk neuroblastoma (autologous)
  - High-risk CNS tumors (autologous)
  - Recurrent Ewing sarcoma family of tumors (autologous, rarely allogeneic)
- Imaging considerations for HSCT should follow guidelines in: **Hematopoietic Stem Cell Transplantation (HSCT) (PEDONC-20)**.

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Modality General Considerations (PEDONC-1.3)

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Criteria

- Plain radiography
  - Chest x-ray (CXR) can provide a prompt means to evaluate primary intrathoracic tumors and continues to be the initial imaging study recommended to detect complications, such as suspected infection, in symptomatic individuals undergoing treatment.
  - CXR continues to be the initial imaging study recommended for pulmonary surveillance for some pediatric cancers. See diagnosis-specific guideline sections for details.
  - Plain radiography continues to be the initial imaging study recommended for evaluation of lesions involving the appendicular skeleton, both during and after completion of treatment. See diagnosis-specific guideline sections for details.
  - Plain abdominal radiographs have largely been replaced by ultrasound, CT, or MRI.
- Ultrasound
  - Ultrasound is not widely used in pediatric oncology for staging but is frequently used for surveillance in individuals who have successfully treated (primarily abdominal or pelvic) tumors with little or no residual disease.
  - See diagnosis-specific guideline sections for details.
- CT
  - CT with contrast is the imaging study of choice in pediatric individuals with lymphomas or solid tumors of the neck, thorax, abdomen, and/or pelvis
    - If CT contrast use is contraindicated due to allergy or impaired renal function, either CT without contrast or MRI without and with contrast may be substituted at the discretion of the ordering physician
- MRI
  - MRI without and with contrast is the study of choice for CNS tumors and musculoskeletal tumors
    - If MRI contrast use is contraindicated due to allergy or impaired renal function, MRI without contrast may be substituted at the discretion of the ordering physician
  - Due to the length of time for image acquisition and the need for stillness, anesthesia is required for almost all infants and young children (age <7 years), as

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well as older children with delays in development or maturity. In this population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:

- MRI should generally be performed without and with contrast unless there is a specific contraindication to gadolinium use since the individual already has intravenous access for anesthesia
  - Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast
  - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAS) use is not warranted at this time
  - It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAS should be assessed
  - If requesting clinicians indicate that a non-contrast study is being requested due to concerns regarding the use of gadolinium, the exam is considered medically necessary

- In some instances, to reduce time under anesthesia for MRI in pediatric individuals, surveillance or restaging studies may be requested with contrast only when it is determined that repeat non-contrast imaging does not add to an individual clinical case. These are considered medically necessary on a case-by-case basis.
  - If multiple body areas are supported by these guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session

- Nuclear medicine
  - General PET imaging consideration can be found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**.
  - Bone scan is frequently used for evaluation of bone metastases in pediatric oncology during initial treatment, treatment response, and surveillance
    - CPT® 78315 has no specific indications for evaluation of malignant disease
  - ^{123}I-metaiodobenzylguanidine (MIBG) scintigraphy is the preferred metabolic imaging for neuroblastoma and is positive in 90% to 95% of neuroblastomas. MIBG is also used for evaluation of pheochromocytomas, paragangliomas, ganglioneuromas, and ganglioneuroblatomas, PET/CT indications are provided in the relevant sections.

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Study Type	Coding
Bone scan	• ANY of the following codes can be approved: ◦ CPT® 78300 ◦ CPT® 78305 ◦ CPT® 78306 ◦ CPT® 78803, 78830, or 78832 ▪ May be approved alone or in combination with: - CPT® 78305 - CPT® 78306
^{123}I-metaiodobenzylguanidine (MIBG) scintigraphy	• ANY one of the following codes can be approved: ◦ CPT® 78801 ◦ CPT® 78802 ◦ CPT® 78804 • In addition to the above imaging, **ONE** of the following codes is considered medically necessary: ◦ CPT® 78803 ◦ CPT® 78830 ◦ CPT® 78831 ◦ CPT® 78832 **OR** ◦ CPT® 78800 may be approved for KNOWN neuroblastoma when only a single site follow up is desired but is not sufficient for the initial workup of suspected disease
Octreotide scan	Same coding as MIBG
Gallium scan	Same coding as MIBG

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PET Imaging in Pediatric Oncology (PEDONC-1.4)

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Throughout these guidelines, unless otherwise specified, the term "PET" refers specifically to ^{18}F-FDG-PET imaging and also applies to PET/CT fusion studies.

Criteria

- PET imaging in pediatric oncology should use PET/CT fusion imaging (CPT® 78815 or CPT® 78816)
- The decision whether to use skull base to mid-femur ("eyes to thighs") procedure code for PET (CPT® 78815) or whole-body PET (CPT® 78816) is addressed in the diagnosis-specific guideline sections.
- PET imaging in oncology should use PET/CT fusion imaging (CPT® 78815 or CPT® 78816)
- PET/MRI is generally not considered medically necessary for a vast majority of oncologic conditions due to lack of standardization in imaging technique and interpretation. However, it is considered medically necessary in select circumstances when all of the following criteria are met:
  - The individual meets condition-specific guidelines for PET/MRI OR
  - The individual meets ALL of the following:
    - The individual meets guideline criteria for PET/CT, AND
    - PET/CT is not available at the treating institution, AND
    - The provider requests PET/MRI in lieu of PET/CT
  - When the above criteria are met, PET/MRI is considered medically necessary using the code combination of PET Whole-Body (CPT® 78813) and MRI Unlisted (CPT® 76498). All other methods of reporting PET/MRI are inappropriate.
    - When clinically appropriate, diagnostic MRI codes may be considered medically necessary at the same time as the PET/MRI code combination.
- Unbundling PET/CT imaging into separate PET (such as CPT® 78812 or CPT® 78813) and diagnostic CT codes is otherwise not considered medically necessary.
- PET imaging is not reliable for the detection of anatomic lesions smaller than 8mm in size.
- Delay PET/CT for at least 12 weeks after completion of radiation treatment, unless required sooner for imminent surgical resection.
- PET imaging using isotopes other than ^{18}F-FDG, ^{68}Ga-DOTATATE, or ^{68}Ga-DOTATOC is considered not medically necessary at this time.

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- PET has not been shown to be diagnostically useful in all forms of childhood cancer. PET is considered medically necessary for pediatric malignancies with significant published evidence regarding its diagnostic accuracy and importance in accurately directing individual care decisions. See diagnosis-specific guideline sections for details.
- PET imaging is not specific to cancer and has a high rate of false positivity. Inflammation, infection (especially granulomatous), trauma, and post-operative healing may show high levels of FDG uptake and be false-positive for malignant lesions.
- PET for rare malignancies not specifically addressed by these guidelines is generally not considered medically necessary due to lack of available evidence regarding diagnostic accuracy of PET in the majority of rare cancers. Conventional imaging studies should be used for initial staging and treatment response for these diagnoses.
- Unless otherwise specified in diagnosis-specific guideline section, PET is considered medically necessary if **all** of the following apply:
  - Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive (including signs or symptoms that are highly suspicious for recurrence with no source found on imaging), with continued suspicion for active disease
  - No other specific metabolic imaging (MIBG, octreotide, technetium, etc.) is considered medically necessary for the cancer type
  - The submitted clinical information describes a specific decision regarding the individual's care that will be made based on the PET results
- PET imaging for surveillance imaging **only** when specifically stated elsewhere in the diagnosis-specific guideline sections
- Unless otherwise specified for a specific cancer type, once PET has been documented to be negative for a given individual's cancer or all PET-avid disease has been surgically resected, PET is not considered medically necessary for continued disease monitoring or surveillance unless **one** of the following applies:
  - Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive or suspicious for recurrence
    - Residual mass that has not changed in size since the last conventional imaging does **not** justify PET imaging
    - PET avidity in a residual mass at the end of planned therapy is **not** an indication for PET imaging during surveillance.
  - Very rare circumstances where tumor markers or obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities
  - The individual is undergoing salvage treatment for a recurrent solid tumor with residual measurable disease on conventional imaging and confirmed repeat negative PET imaging will allow the individual to transition from active treatment to surveillance

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Diagnostic Radiation Exposure in Pediatric Oncology (PEDONC-1.5)

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Criteria

- Young children are presumed to be at increased risk for malignancy from diagnostic radiation exposure, most commonly from CT and nuclear medicine imaging. They are more sensitive to radiation than adults and generally live longer after receiving radiation doses from medical procedures, resulting in a larger number of years during which to manifest a cancer.
- Because of this presumed increased risk in young children, requests to substitute MRI without and with contrast for CT with contrast to avoid radiation exposure are considered medically necessary if ALL of the following criteria apply:
  - The individual is presently a young child and the ordering physician has documented the reason for MRI, rather than CT, is to avoid radiation exposure.
  - The disease-specific guidelines do not list CT as superior to MRI for the current disease and time point, meaning the MRI will provide equivalent or superior information relative to CT.
  - The request is for a body area other than Chest as MRI is substantially inferior to CT for detection of small pulmonary metastases.
- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

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Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)

Guideline

Screening Imaging in Cancer Predisposition Syndromes – General Considerations (PEDONC-2.1)
Li-Fraumeni Syndrome (LFS) (PEDONC-2.2)
Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)
Beckwith-Wiedemann Syndrome (BWS) (PEDONC-2.4)
Denys-Drash Syndrome (DDS) (PEDONC-2.5)
Wilms Tumor-Aniridia-Growth Retardation (WAGR) (PEDONC-2.6)
Familial Adenomatous Polyposis (FAP) and Related Conditions (PEDONC-2.7)
Multiple Endocrine Neoplasias (MEN) (PEDONC-2.8)
Tuberous Sclerosis Complex (TSC) (PEDONC-2.9)
Von Hippel-Lindau Syndrome (VHL) (PEDONC-2.10)
Rhabdoid Tumor Predisposition Syndrome (PEDONC-2.11)
Familial Retinoblastoma Syndrome (PEDONC-2.12)
Hereditary Paraganglioma-Pheochromocytoma (HPP) Syndromes (PEDONC-2.13)
Costello Syndrome (PEDONC-2.14)
Constitutional Mismatch Repair Deficiency (CMMRD or Turcot Syndrome) (PEDONC-2.15)
Hereditary Leiomyomatosis and Renal Cell Cancer (HLRCC) (PEDONC-2.16)
Other Renal Cell Cancer Predisposition Syndromes (PEDONC-2.17)
Infantile Myofibromatosis (PEDONC-2.18)
Bloom Syndrome (PEDONC-2.19)
References (PEDONC-2)

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Screening Imaging in Cancer Predisposition Syndromes – General Considerations (PEDONC-2.1)

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Criteria

- This section is intended to give guidance for screening imaging prior to diagnosis with a specific malignancy. Once an individual with a cancer predisposition syndrome has been diagnosed with a malignant disease, future imaging decisions should be guided by the appropriate disease-specific guidelines except as explicitly stated elsewhere in this section.
- This section's guidelines are limited to cancer predisposition syndromes with screening imaging considerations. Syndromes requiring only clinical or laboratory screening are not discussed here.
- In general, a relevant detailed history and physical examination and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the individual is undergoing guideline-supported scheduled screening evaluation identified in this section.
- Where MRI is indicated in these guidelines, CT is considered medically necessary only if MRI is contraindicated, given the risk of radiation exposure in these syndromes.
- Many of these cancer predisposition syndromes also affect adults as survival continues to improve for these individuals.
    - Adults with syndromes covered in this section may follow these imaging guidelines except where contradicted by specific statements in the general imaging guidelines.
- Documentation of genetic or molecular confirmation of the appropriate syndrome with increased cancer risk is preferred for any individual to qualify for screening imaging. There are a number of complex ethical, social, and financial issues involved in the decision to complete genetic testing in a pediatric individual.
    - From the 2013 AAP Policy Statement, "Predictive genetic testing for adult-onset conditions generally should be deferred unless an intervention initiated in childhood may reduce morbidity or mortality." **Imaging surveillance is one such intervention and should not be performed without justifiable cause**.
    - Genetic testing should be performed in conjunction with genetic counseling for appropriate communication of risks identified by testing.

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- When genetic testing is not possible, formal diagnosis after evaluation by a physician with significant training and/or experience in cancer predisposition syndromes (most commonly a geneticist or oncologist) is generally sufficient to confirm eligibility for screening imaging.

- Due to the length of time for image acquisition and the need for stillness, anesthesia is required for almost all infants and young children (age <7 years), as well as older children with delays in development or maturity. In this individual population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:
  - MRI should always be performed without and with contrast unless there is a specific contraindication to gadolinium use since the individual already has intravenous access for anesthesia.
    - Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
    - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If requesting clinicians indicate that a non-contrast study is being requested due to concerns regarding the use of gadolinium, the exam is considered medically necessary.
    - In some instances, to reduce time under anesthesia for MRI in pediatric individuals, surveillance or restaging studies may be requested with contrast only when it is determined that repeat non-contrast imaging does not add to an individual clinical case. These are considered medically necessary on a case-by-case basis.
  - If multiple body areas are supported by these guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session
- If a given genetic syndrome does not have documented evidence-based criteria for whole-body MRI as noted in these guidelines, then whole-body MRI is not considered medically necessary.

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Li-Fraumeni Syndrome (LFS) (PEDONC-2.2)

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Criteria

When a specific malignancy is suspected, the individuals should be imaged according to the imaging guideline specific to the suspected cancer type.

The following imaging studies should be considered medically necessary in individuals with LFS:

Indication	Medically Necessary Imaging Study
All individuals with LFS	• BOTH of the following, annually: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ Whole-body MRI (WBMRI, CPT® 76498) ▪ CPT® 76498 is the only code for whole-body MRI at this time. • Every 3 months from birth: ◦ Abdominal (CPT® 76700) and pelvic (CPT® 76856) ultrasound • Beginning at age 20: ◦ Annual Breast MRI (CPT® 77049), alternating every 6 months with breast ultrasound, in addition to the previously noted annual MRI studies.
Individuals with LFS with documented signs or symptoms suggestive of possible malignancy	• Targeted MRI without and with contrast of the involved body area(s)

Background and Supporting Information

- LFS is a hereditary cancer predisposition syndrome characterized by autosomal dominant inheritance, with a 50% risk of transmission to offspring, caused by germline pathogenic variants in the TP53 tumor suppressor gene (Schneider et al., 2025).
- LFS is associated with markedly increased lifetime cancer risk across multiple organ systems, with early onset of malignancy common. Core tumor types include

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adrenocortical carcinoma, central nervous system tumors, osteosarcoma, soft tissue sarcomas, and early onset breast cancer (Schneider et al., 2025).
  - Additional malignancies relevant to imaging surveillance include leukemia, colorectal cancer, lung cancer, melanoma, pancreatic cancer, and prostate cancer, with affected individuals at increased risk for developing multiple primary cancers over their lifetime (Schneider et al., 2025).
- The majority of individuals with LFS have germline TP53 pathogenic variants. In contrast, somatic (tumor-specific) TP53 variants are common in sporadic malignancies and do not confer inherited cancer risk or eligibility for LFS-specific imaging surveillance protocols (Schneider et al., 2025).
  - Accurate distinction between germline and somatic TP53 alterations is necessary to determine appropriateness of screening and surveillance imaging strategies (Schneider et al., 2025).
- In individuals who meet clinical diagnostic criteria for LFS but do not have an identifiable germline TP53 pathogenic variant, formal diagnosis should be assigned by a physician with significant training and experience in LFS, typically a geneticist or oncologist, prior to initiation of a screening imaging program (Schneider et al., 2025).

Evidence Discussion

- Individuals with LFS have increased susceptibility to radiation-induced malignancies due to defective TP53 mediated DNA damage response, and exposure to ionizing radiation may increase the risk of secondary cancers. As a result, routine surveillance strategies that rely on ionizing radiation, including CT and most nuclear medicine studies, are not considered medically necessary for ongoing screening in LFS (Schneider et al., 2025).
- Whole body MRI and brain MRI provide broad, multi-organ cancer detection without ionizing radiation and are therefore preferred surveillance modalities in individuals with LFS. MRI-based surveillance enables detection of a wide spectrum of tumor types characteristic of LFS and aligns with the need for lifelong, repeat imaging in this population. Prospective cohort studies of individuals with LFS undergoing MRI-based surveillance have demonstrated earlier cancer detection and improved survival outcomes compared with historical controls (Schneider et al., 2025).
  - Recognized limitations of MRI-based surveillance include false positive findings, increased follow up imaging or procedures, and the need for sedation in younger children; however, these risks are generally outweighed by the benefit of early detection in this high risk population (Schneider et al., 2025).

Health Equity Considerations

LFS is a rare hereditary cancer predisposition syndrome caused by pathogenic germline TP53 variants and is associated with an exceptionally high lifetime risk of developing multiple, early onset malignancies, often beginning in childhood. Families affected by

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LFS face disproportionate challenges related to access to timely genetic diagnosis, specialized surveillance programs, and pediatric-specific expertise. Comprehensive surveillance protocols, often initiated from birth and including frequent whole body and brain MRI, have demonstrated survival benefit but require advanced imaging infrastructure, pediatric sedation services, and multidisciplinary coordination that may not be uniformly available across care settings (Kiermeier et al., 2025). Delays in diagnosis or limited access to recommended surveillance can exacerbate disparities, particularly for families in rural areas, lower resource health systems, or those with limited health literacy navigating complex hereditary cancer care pathways. These structural barriers may result in missed early cancers or inconsistent longitudinal imaging, contributing to unequal outcomes despite shared genetic risk.

In addition to structural access issues, psychosocial burden represents a critical and often underrecognized equity consideration in pediatric and special populations with LFS. Evidence indicates that individuals with LFS, including adolescents, young adults, parents, and "previvors" without a prior cancer diagnosis, experience high levels of distress, fear of progression, and impaired health-related quality of life associated with lifelong cancer risk and intensive surveillance regimens (Kiermeier et al., 2025). These psychological stressors may influence adherence to imaging surveillance and follow up recommendations, particularly in families facing cumulative socioeconomic stress or limited access to integrated psychosocial support. Consistent application of evidence based, radiation-sparing imaging strategies supports equity by standardizing high value surveillance while minimizing harm. Integrating guideline directed imaging with coordinated genetic counseling and psychosocial resources promotes equitable care delivery for children and families living with LFS, ensuring that survival benefits of early detection are not undermined by disparities in access, support, or continuity of care (Kiermeier et al., 2025).

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Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)

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Criteria

- Considerations for PET/CT coding and indications/coding for PET/MRI are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

The following imaging studies should be considered medically necessary in individuals with NF1:

Indication	Medically Necessary Imaging Study
• Clarification of the diagnosis of NF1 if evaluation by a physician with significant training and/or experience in neurofibromatosis is inconclusive ◦ Most commonly a neurologist, geneticist, ophthalmologist, or oncologist	• One-time MRI Brain (CPT® 70553) and Orbits (CPT® 70543) without and with contrast
• New or worsening neurological or visual symptoms in individuals with NF1	• MRI Brain (CPT® 70553) and Orbits (CPT® 70543) without and with contrast
• Clinical symptoms suggestive of change in a known plexiform neurofibroma in individuals with NF1 ◦ Examples include: pain, rapid growth, and neurologic dysfunction	• MRI without and with contrast
• Clinical symptoms concerning for malignant transformation of a known plexiform neurofibroma in individuals with NF1, and ALL of the following are met: ◦ Recent MRI is inconclusive regarding transformation or progression ◦ Negative PET will result in a decision to avoid biopsy in a difficult or morbid location	• PET/CT (CPT® 78815 or 78816)

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Indication	Medically Necessary Imaging Study
• Baseline tumor burden in individuals with NF1 at age 16 or older (one-time imaging)	• WBMBRI (CPT® 76498)
• New soft tissue mass(es) in individuals with NF1	• See: Soft tissue mass information in **Soft Tissue Mass and Morton's Neuroma (MS 10.3)** in the Musculoskeletal Imaging Guidelines or **Soft Tissue and Bone Masses – General Considerations (PEDMS 3.1)** in the Pediatric Musculoskeletal Imaging Guidelines depending on the individual's age at the time the mass is discovered. Plain x-ray or ultrasound is not required prior to advanced imaging in these individuals.
• New bone mass(es) in individuals with NF1	• See: **Bone Tumors - General Considerations (PEDONC-9.1)**
• Documented optic pathway gliomas in individuals with NF1	• See: **Intracranial Low Grade Gliomas (PEDONC-4.2)**
• Known plexiform neurofibromas in individuals with NF1	• MRI without and with contrast of a known body area containing a neurofibroma is indicated for any of the following: ◦ Every 3 months for treatment response in individuals receiving active treatment ◦ New or worsening clinical symptoms suggesting progression ◦ Preoperative planning
• Biopsy-proven MPNST in individuals with known NF1 or NF2	• For adult individuals, see: **ONC-12 Sarcomas-bone, soft tissue and GIST** • For pediatric individuals, see: **Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS) (PEDONC-8.3)**

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- CT and/or nuclear medicine studies may be considered medically necessary in individuals with NF1 for acute clinical situations and should be judged on a case-by-case basis.
- Annual ophthalmology evaluation is strongly recommended beginning at the time of diagnosis of NF1 to evaluate for optic pathway abnormalities:
  - Screening MRIs Brain (CPT® 70553) and Orbits (CPT® 70543) without and with contrast for asymptomatic individuals with NF1 are not generally recommended due to the ~60% rate of unidentified bright objects (UBOs, T2-weighted signal abnormalities) which mostly disappear by age 30
    - Routine follow up imaging of UBOs is not considered medically necessary in the absence of acute symptoms suggesting new or worsening intracranial disease in individuals with NF1

Background and Supporting Information

- NF1 is a common hereditary multisystem tumor predisposition syndrome inherited in an autosomal dominant manner, with a 50% risk of transmission to offspring. Approximately 50% of affected individuals have de novo pathogenic variants. Penetrance is close to 100%, though clinical severity is highly variable (Friedman, 2025).
- NF1 affects approximately 1 in 2,000–2,500 individuals, making it one of the most common autosomal dominant genetic disorders (Friedman, 2025).
- NF1 is associated with an increased risk of benign and malignant tumors, many of which may be internal or asymptomatic (Friedman, 2025), including:
  - Plexiform neurofibromas, which are frequently internal and best characterized by MRI
  - Optic pathway gliomas, most commonly occurring in early childhood
  - Non optic central nervous system gliomas
  - MPNST, which typically arise from pre existing plexiform neurofibromas and may demonstrate imaging features suggestive of malignant transformation
- Individuals with NF1 are at increased risk for developing multiple tumors over time (Friedman, 2025).
- Although many NF1 associated tumors are benign, malignant transformation can occur, particularly to MPNST, which represents a major cause of morbidity and mortality in this population (Friedman, 2025).

Evidence Discussion

- A substantial proportion of NF1-associated tumors are not apparent on physical examination and may be detected incidentally or through targeted imaging performed for clinical indications (Friedman, 2025).

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- Individuals with NF1 have increased sensitivity to ionizing radiation, with elevated risks of radiation associated malignancies and vasculopathy. Therefore, CT and nuclear medicine studies are not considered medically necessary for routine screening or surveillance, and MRI is preferred when imaging is clinically indicated (Friedman, 2025).
- Individuals with NF1 are at increased risk for plexiform neurofibromas and MPNST; however, screening imaging of asymptomatic individuals is not considered medically necessary, as malignant transformation is typically signaled by clinical changes such as persistent pain, rapid growth, or new neurologic deficits rather than imaging findings alone (Friedman, 2025).
- FDG-PET imaging may be useful when malignant transformation to MPNST is clinically suspected, as the negative predictive value is high (approximately 96%–99%), although the positive predictive value is limited (approximately 60%–65%), even in symptomatic patients (Friedman, 2025).
  - PET imaging is not considered medically necessary for routine surveillance of plexiform neurofibromas (Friedman, 2025).
  - Inconclusive PET findings should prompt tissue biopsy; repeat PET imaging is not considered medically necessary due to limited additional diagnostic yield (Friedman, 2025).
- AACR recommendations support a single baseline whole body MRI in late adolescence or young adulthood to establish tumor burden. Subsequent imaging should be targeted and symptom driven; routine serial whole body MRI surveillance is not considered medically necessary (Evans et al., 2017).

Health Equity Considerations

NF1 is a common inherited cancer predisposition syndrome affecting approximately 1 in 2,000–3,000 individuals, with clinical manifestations that often begin in early childhood and evolve over time. Children with NF1 face disproportionate challenges related to access to specialized care, timely imaging, and consistent long term surveillance for tumor related complications. NF1 management frequently requires advanced imaging, including MRI for evaluation of optic pathway gliomas, plexiform neurofibromas, and other central or peripheral nervous system tumors. However, access to specialty neurofibromatosis clinics and receipt of guideline-recommended surveillance is uneven, with documented disparities by geography, socioeconomic status, insurance type, and race/ethnicity, particularly in the United States (Merker et al., 2025). Children who do not receive care through specialized NF clinics are less likely to complete recommended surveillance evaluations, increasing the risk of delayed diagnosis and potentially preventable morbidity (Merker et al., 2025).

Beyond access to specialty services, the clinical heterogeneity of NF1 contributes to inequities in recognition, imaging utilization, and care coordination. Pediatric patients with plexiform neurofibromas experience substantial clinical and humanistic burden,

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including chronic pain, disfigurement, functional impairment, and reduced health-related quality of life across physical, emotional, social, and school domains (Yang et al., 2022; Iheanacho et al., 2022). Disease severity and visibility are associated with worse quality of life outcomes and increased psychosocial stress, particularly in children with more extensive or symptomatic disease (Cavallo et al., 2024). Families with fewer resources may face additional barriers navigating repeated imaging, prolonged surveillance, surgical consultations, and emerging targeted therapies, compounding disparities over time. Standardized, evidence-based imaging recommendations support equity by promoting appropriate, risk aligned surveillance while avoiding unnecessary imaging in lower risk scenarios. Consistent application of these guidelines, coupled with improved access to specialty expertise and psychosocial support, is essential to ensure that children with NF1 receive equitable, high quality care regardless of disease visibility, geographic location, or socioeconomic context (Merker et al., 2025; Cavallo et al., 2024).

Criteria

The following imaging studies should be considered medically necessary in individuals with NF2:

Indication	Medically Necessary Imaging Study
• All individuals with NF2, beginning at age 10 years	• Annual MRI Brain without and with contrast (CPT® 70553)
• All individuals with NF2 without a history of spinal tumors, beginning at age 10 years	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) annually for 2 years, then every 3 years
• All individuals with NF2 with a history of spinal tumors	• Annual MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
• Clinical symptoms of intracranial mass or vestibular disease in individuals with NF2	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
• Any of the following in individuals with NF2: ◦ Clinical symptoms suggestive of new or progressive spinal or paraspinal tumors, including uncomplicated back pain or radiculopathy ◦ Recent diagnosis with a meningioma or vestibular schwannoma	• MRI Spine without and with contrast (Cervical-CPT 72156, Thoracic-CPT 72157, Lumbar-CPT 72158)
• Surveillance for progression of unresected tumors in individuals with NF2 with known vestibular schwannoma	• Annual MRI Brain without and with contrast (CPT® 70553)
• Known vestibular schwannomas and any of the following in individuals with NF2: ◦ New or worsening clinical symptoms including hearing loss ◦ Preoperative planning	• MRI Brain without and with contrast (CPT® 70553)
• Known meningioma in individuals with NF2	• See **Meningiomas (ONC-2.8)** in the Oncology Imaging Guidelines
• Known ependymoma in individuals with NF2	• See **Ependymoma (PEDONC-4.8)**

Background and Supporting Information

- NF2 is a hereditary tumor predisposition syndrome distinct from NF1 and substantially less common. It is inherited in an autosomal dominant manner, with up to a 50% risk of transmission to offspring. Approximately 50% of individuals have de novo pathogenic variants, and somatic mosaicism is common. Penetrance is close to 100% over a lifetime (Evans, 2023).
- The estimated prevalence of NF2 is approximately 1 in 50,000, with a birth incidence of about 1 in 28,000 (Evans, 2023).
- NF2 is characterized by a high burden of intracranial and spinal tumors, many of which are progressive and require longitudinal imaging assessment (Evans, 2023), including:
  - Bilateral vestibular schwannomas, present in approximately 85%–90% of affected individuals and nearly universal by age 30
  - Intracranial meningiomas, occurring in approximately 50% of individuals, with higher lifetime risk

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  - Spinal tumors, present in at least two thirds of individuals, including intradural extramedullary schwannomas and intramedullary tumors
  - Ependymomas, occurring in approximately 25% of individuals
- NF2-associated tumors are often multiple, bilateral, and slow growing, and may be asymptomatic at the time of detection (Evans, 2023).
- Tumor burden and distribution vary widely among individuals, and multiple tumor types may coexist, supporting the need for comprehensive neuroaxis evaluation when NF2 is present or suspected (Evans, 2023).

Evidence Discussion

- MRI is the preferred imaging modality for evaluation and surveillance in NF2 due to the high lifetime risk of central nervous system tumors and the need for repeated longitudinal imaging (Evans, 2023).
- Annual brain MRI beginning in late childhood (approximately age 10 years) and continuing through at least early adulthood is considered medically necessary for affected and at risk individuals, as tumors are frequently asymptomatic in early stages and optimal outcomes depend on detection prior to neurologic compromise (Evans, 2023).
- Spinal MRI is considered medically necessary when clinically indicated (e.g., new neurologic deficits, pain, or pre procedural planning). Routine whole spine screening in asymptomatic individuals is not universally considered medically necessary, as many spinal tumors remain indolent and clinically silent (Evans, 2023).
- CT and other ionizing radiation-based imaging should be minimized, particularly in children and young adults with NF2, due to increased risks of radiation-induced malignant transformation and secondary central nervous system malignancies. Radiation-based therapies and repeated radiation imaging are associated with elevated long term risks of malignant progression in NF2-associated tumors and should be avoided for surveillance when MRI provides adequate diagnostic information (Evans, 2023).
  - MRI is preferred over CT for pre-operative planning and longitudinal assessment of vestibular schwannomas, meningiomas, and spinal tumors, given superior soft tissue characterization and avoidance of cumulative radiation exposure (Evans, 2023).

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Beckwith-Wiedemann Syndrome (BWS) (PEDONC-2.4)

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Criteria

Individuals with isolated hemihypertrophy are also imaged according to this guideline.

The following imaging studies should be considered medically necessary in individuals with BWS:

Indication	Medically Necessary Imaging Study
• All individuals with BWS, from birth to the 8th birthday	• Abdominal ultrasound (CPT® 76700) every 3 months
• Purely cystic adrenal mass found on screening ultrasound in individuals with BWS	• Continue screening ultrasound (CPT® 76700 or 76705) every 3 months without additional imaging (i.e., advanced imaging is not considered medically necessary for a purely cystic adrenal mass)
• Solid or mixed adrenal mass found on screening ultrasound in individuals with BWS AND: ◦ Individual age 0 months to 5 months, and ◦ Mass 0cm to 3cm in diameter	• MIBG imaging (See: **PEDONC-1.3** for coding) and either CT or MRI Abdomen (contrast as requested)
• Solid or mixed adrenal mass found on screening ultrasound in individuals with BWS AND: ◦ Individual age 0 to 5 months, and ◦ Mass >3cm in diameter	• MIBG imaging (See: **PEDONC-1.3** for coding) and MRI Abdomen (contrast as requested)
• Solid or mixed adrenal masses on screening ultrasound in individuals with BWS AND: ◦ Individual age 6 months or greater	• MIBG imaging (See: **PEDONC-1.3** for coding) prior to biopsy or resection ◦ If no evidence of malignancy on biopsy or resection, resume screening abdominal ultrasound every 3 months

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Indication	Medically Necessary Imaging Study
• Solid or mixed adrenal masses on screening ultrasound in individuals with BWS AND: ◦ No evidence of malignancy based on MIBG, CT or MRI, Urine HVA/ VMA, and serum ACTH	• Repeat abdominal ultrasound (CPT® 76700 or 76705) every 6 weeks for 2 years
• Known renal tumors in individuals with BWS	• See: **Pediatric Renal Tumors (PEDONC-7)**
• Known hepatoblastoma in individuals with BWS	• See: **Hepatoblastoma (PEDONC-11.2)**
• Known neuroblastoma in individuals with BWS	• See: **Neuroblastoma (PEDONC-6)**
• Known adrenocortical carcinoma in individuals with BWS	• See: **Pediatric Adrenocortical Carcinoma (PEDONC-14)**
• Known pheochromocytoma in individuals with BWS	• See: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines

Background and Supporting Information

- BWS, also referred to as Beckwith Wiedemann spectrum, is a congenital overgrowth disorder characterized by variable features including macroglossia, macrosomia, hemihyperplasia (lateralized overgrowth), visceromegaly, omphalocele, and neonatal hypoglycemia. Clinical expression is heterogeneous, and affected individuals may demonstrate only one or a subset of characteristic findings (Shuman et al., 2023).
- BWS is caused by epigenetic and/or genomic alterations involving imprinted genes on chromosome 11p15.5, leading to dysregulated growth factor expression. The condition is most commonly sporadic and frequently associated with somatic mosaicism, although rare familial cases occur depending on the underlying molecular mechanism (Shuman et al., 2023).
- Children with BWS are at increased risk for embryonal tumors, particularly Wilms tumor and hepatoblastoma, and less commonly neuroblastoma, rhabdomyosarcoma, and adrenocortical carcinoma. Tumor risk is concentrated in early childhood and varies by molecular subtype (Shuman et al., 2023).
- Risk for Wilms tumor is highest in the first seven years of life, while risk for hepatoblastoma is concentrated in the first three to four years of life (Shuman et al., 2023).

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- Many BWS-associated tumors arise intra-abdominally and may be clinically occult at early stages, supporting guideline-directed imaging surveillance during defined risk periods (Shuman et al., 2023).

Evidence Discussion

- Ultrasound is the preferred imaging modality for tumor surveillance in individuals with BWS due to its effectiveness in detecting renal, hepatic, adrenal, and other intra-abdominal tumors and its lack of ionizing radiation exposure (Shuman et al., 2023).
- Periodic tumor surveillance imaging is considered medically necessary in childhood for individuals with BWS, including those with mild clinical manifestations or nondiagnostic genetic testing results, because somatic mosaicism may limit molecular risk stratification and tumor development may occur in tissues not represented in tested samples (Shuman et al., 2023).
- CT and other ionizing radiation-based imaging modalities are not considered medically necessary for routine tumor surveillance in BWS and should be avoided when effective non-ionizing alternatives are available (Shuman et al., 2023).
- MRI is not routinely considered medically necessary for standard surveillance in asymptomatic individuals with BWS in the absence of concerning findings (Shuman et al., 2023).
- Imaging may be performed to evaluate non-neoplastic manifestations of BWS, such as nephromegaly, nephrocalcinosis, or structural renal anomalies, when clinically indicated. Routine cross-sectional imaging beyond guideline-directed tumor surveillance is not considered medically necessary in asymptomatic individuals and should not be performed solely on the basis of a BWS diagnosis (Shuman et al., 2023).

Health Equity Considerations

BWS is a rare imprinting disorder characterized by clinical heterogeneity, variable tumor risk, and the need for structured imaging surveillance throughout infancy and early childhood. Disparities in recognition, diagnosis, and follow-up care are well documented and have direct implications for timely oncologic imaging. Although BWS occurs across all racial and ethnic groups, differences in age at diagnosis, presenting features, and molecular subtypes have been observed among diverse populations. In particular, non-Caucasian and mixed race patients are more likely to be diagnosed later and to present with less visually apparent features such as hyperinsulinemic hypoglycemia or nephromegaly, rather than classic external findings like macroglossia or omphalocele, which may delay recognition and initiation of tumor surveillance imaging (Duffy et al., 2020). Delayed diagnosis can result in missed or inconsistent abdominal ultrasound screening for embryonal tumors, increasing the risk of later stage detection and worse outcomes.

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Health equity challenges in BWS also extend beyond diagnostic delay to the cumulative burden of surveillance and psychosocial stressors faced by affected families. Tumor screening protocols require frequent, age-specific imaging, which can impose logistical and financial strain, particularly for families with limited resources or reduced access to specialized centers. Parental anxiety related to cancer risk and repeated imaging is substantial and may influence adherence to surveillance recommendations, especially in populations already experiencing barriers to longitudinal care (Butti et al., 2024). Additionally, children and adolescents with BWS show increased rates of internalizing symptoms, including anxiety and social withdrawal, which may be amplified by frequent medical encounters and perceived stigma associated with physical differences or chronic disease (Butti et al., 2024). Ensuring equitable access to guideline-concordant imaging therefore requires not only standardized surveillance recommendations but also attention to culturally sensitive counseling, care coordination, and psychosocial support. Standardized, risk-stratified imaging recommendations for BWS support equity by reducing variability driven by clinician experience, implicit bias, or access to subspecialty expertise. Consistent application of evidence-based surveillance pathways helps mitigate disparities related to race, ethnicity, and socioeconomic status by ensuring that all children with BWS, regardless of phenotypic presentation or background, receive appropriate tumor screening at recommended intervals. Incorporating awareness of diagnostic bias, facilitating access to genetic evaluation, and supporting families through longitudinal imaging programs are critical components of equitable, high-quality care for this population (Duffy et al., 2020; Butti et al., 2024).

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Denys-Drash Syndrome (DDS) (PEDONC-2.5)

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Criteria

The following imaging studies should be considered medically necessary in individuals with DDS:

Indication	Medically Necessary Imaging Study
• All individuals with DDS, from birth to the 8th birthday	• Abdominal ultrasound (CPT® 76700) every 3 months
• Known renal tumors in individuals with DDS	• See: **Pediatric Renal Tumors (PEDONC-7)**

Background and Supporting Information

- DDS is a rare WT1-associated disorder characterized by the classic triad of disorders of sex development (including undervirilized or ambiguous genitalia), early onset progressive renal disease (most commonly diffuse mesangial sclerosis), and an exceptionally high risk of Wilms tumor. Renal disease typically presents in infancy or early childhood and frequently progresses to end-stage kidney disease (Turner, Brzezinski, & Dome, 2022).
- DDS is caused by heterozygous pathogenic variants in the WT1 gene on chromosome 11p13, most commonly missense variants involving exons 8 or 9. These variants disrupt WT1 transcriptional activity essential for normal renal and genitourinary development (Turner, Brzezinski, & Dome, 2022).
- Individuals with DDS have a markedly elevated risk of Wilms tumor, often cited as exceeding 90% lifetime risk, with frequent bilateral, multifocal, or early onset disease. Tumors may develop in infancy or early childhood and can arise concurrently with, or shortly after, recognition of renal dysfunction (Turner, Brzezinski, & Dome, 2022).
- Progressive renal failure is common in DDS, and preservation of renal function is a critical management goal. Early identification of Wilms tumor through structured imaging surveillance may facilitate nephron-sparing surgical approaches, potentially preserving residual renal function and delaying the need for renal replacement therapy (Turner, Brzezinski, & Dome, 2022).

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Evidence Discussion

- Abdominal ultrasound is the preferred imaging modality for Wilms tumor surveillance in children with DDS. Ultrasound is non-ionizing, well-tolerated in infants and young children, and effective for detecting renal masses and nephrogenic rests, which are common precursor lesions in WT1-associated disease (Turner, Brzezinski, & Dome, 2022).
- Routine surveillance with abdominal ultrasound is considered medically necessary in children with DDS due to the exceptionally high risk of Wilms tumor, the tendency toward early onset and bilateral disease, and the importance of early detection to support nephron-sparing management strategies. Surveillance imaging with abdominal ultrasound every three months is recommended in individuals with WT1-associated Wilms tumor predisposition, including DDS, to allow detection of rapidly growing tumors at an early and potentially more treatable stage (Turner, Brzezinski, & Dome, 2022).
  - Surveillance is generally continued through early childhood, encompassing the age range during which the vast majority of WT1-associated Wilms tumors are diagnosed; the duration of surveillance may be individualized based on genotype, clinical course, renal status, and treating specialist judgment (Turner, Brzezinski, & Dome, 2022).
- MRI is not considered medically necessary for routine Wilms tumor surveillance and should not replace ultrasound as the first line screening modality in asymptomatic individuals with DDS (Turner, Brzezinski, & Dome, 2022).
- CT imaging should be avoided for routine surveillance in DDS due to cumulative exposure to ionizing radiation in a population requiring frequent and repeated imaging (Turner, Brzezinski, & Dome, 2022).

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Wilms Tumor-Aniridia-Growth Retardation (WAGR) (PEDONC-2.6)

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Criteria

The following imaging studies should be considered medically necessary in individuals with WAGR:

Indication	Medically Necessary Imaging Study
• All individuals with WAGR, from birth to the 8th birthday	• Abdominal ultrasound (CPT® 76700) every 3 months
• Known renal tumors in individuals with WAGR	• See: **Pediatric Renal Tumors (PEDONC-7)**

Background and Supporting Information

- WAGR is a contiguous gene deletion disorder named for its cardinal features: Wilms tumor, aniridia, genitourinary anomalies, and growth retardation, with variable degrees of intellectual disability. The phenotype results from haploinsufficiency of multiple genes critical for renal, ocular, and genitourinary development (Turner, Brzezinski, & Dome, 2022).
- WAGR is caused by a heterozygous deletion at chromosome 11p13 encompassing the WT1 gene and the adjacent PAX6 gene. Loss of WT1 confers a high risk of Wilms tumor, while deletion of PAX6 causes congenital aniridia. Most cases arise de novo (Turner, Brzezinski, & Dome, 2022).
- Individuals with WAGR have a substantially increased risk of Wilms tumor, reported in approximately 45–60% of affected individuals. Tumors typically arise in early childhood, and bilateral or multifocal disease may occur (Turner, Brzezinski, & Dome, 2022).
- Children with WAGR are at increased risk for progressive renal dysfunction due to congenital kidney abnormalities and, in those who develop Wilms tumor, the cumulative effects of tumor-directed therapy. Among affected individuals who develop symptomatic Wilms tumor, the risk of subsequent renal failure is significant. Early tumor detection via imaging surveillance may facilitate nephron-sparing surgical approaches, with the goal of preserving renal function and delaying progression to end-stage kidney disease (Turner, Brzezinski, & Dome, 2022).

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Evidence Discussion

- Imaging surveillance is considered medically necessary in children with WAGR to enable early detection of Wilms tumor at a low stage, thereby reducing treatment intensity, treatment-related morbidity, and risk of renal failure. Given the rapid growth kinetics of Wilms tumor, regular imaging at defined intervals is required for effective early detection (Turner, Brzezinski, & Dome, 2022).
- Abdominal ultrasound is the preferred modality for routine Wilms tumor surveillance in WAGR. Ultrasound is non-ionizing, widely available, and effective for detection of renal masses and nephrogenic rests, which are recognized precursors to Wilms tumor in WT1-associated conditions. Surveillance with abdominal ultrasound every three months is recommended, beginning in infancy or at the time of diagnosis. Surveillance is generally continued until at least age eight years, encompassing the period during which the vast majority of Wilms tumors associated with WAGR occur (Turner, Brzezinski, & Dome, 2022).
- MRI is not considered medically necessary for routine surveillance and should not replace ultrasound as first line screening, particularly given the need for sedation in young children and limited incremental benefit for screening purposes (Turner, Brzezinski, & Dome, 2022).
- Routine cross-sectional imaging beyond established Wilms tumor surveillance protocols is not considered medically necessary in asymptomatic individuals with WAGR syndrome and should be reserved for specific clinical indications (Turner, Brzezinski, & Dome, 2022).

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Familial Adenomatous Polyposis (FAP) and Related Conditions (PEDONC-2.7)

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Criteria

- Individuals with Lynch, Gardner, and Turcot syndromes should also be imaged according to these guidelines.

The following imaging studies should be considered medically necessary in individuals with FAP and related conditions:

- For colonoscopy and endoscopy guidance for those with FAP and related conditions, See: *EGD-1.16*, *CAPEND-5*, or *COLON-17: Genetic Syndromes* for the endoscopic management of polyposis syndromes.

Indication	Medically Necessary Imaging Study
• All individuals with FAP and related conditions, from birth to the 6th birthday	• Abdominal ultrasound (CPT® 76700) every 3 months
• All individuals with FAP and related conditions, beginning at age 12 years	• Annual thyroid ultrasound (CPT® 76536)
• All individuals with FAP and related conditions, beginning at age 30 years	• Annual pelvic ultrasound (CPT® 76856)
• Family history of desmoid tumors in individuals with FAP and related conditions	• Abdominal ultrasound (CPT® 76700) annually for life after age 6
• Individuals with Spigelman Stage III or IV or if duodenectomy is being planned in individuals with FAP and related conditions • See: *Genetic Syndromes (EGD-1.16)* for additional information regarding Spigelman staging.	• MR Enterography (MRI Abdomen without and with contrast, CPT® 74183 and MRI Pelvis without and with contrast, CPT® 72197)

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Indication	Medically Necessary Imaging Study
• Known colorectal tumors in individuals with FAP and related conditions	• See: **Colorectal Cancer (ONC-16)** in the Oncology Imaging Guidelines
• Known desmoid tumors in individuals with FAP and related conditions	• See: **Sarcomas – Bone, Soft Tissue, and GIST (ONC-12)**

Background and Supporting Information

- FAP is an autosomal dominant cancer predisposition syndrome caused by pathogenic variants in the APC gene. Affected individuals have a 50% risk of transmission to offspring. Classic FAP is characterized by the development of hundreds to thousands of adenomatous colorectal polyps, typically beginning in childhood or adolescence (Yen et al., 2022).
- Without intervention, individuals with classic FAP have a greater than 90% lifetime risk of colorectal carcinoma, with cancer often developing by early adulthood. As a result, prophylactic colectomy is generally recommended once polyp burden becomes significant, often by late adolescence or early adulthood (Yen et al., 2022).
- In addition to colorectal neoplasia, FAP is associated with an increased risk of several extracolonic malignancies, including hepatoblastoma, duodenal and small bowel adenocarcinoma, thyroid cancer (particularly papillary carcinoma), pancreatic cancer, and central nervous system tumors such as medulloblastoma (Yen et al., 2022).
- The risk of hepatoblastoma is concentrated in early childhood, making targeted abdominal surveillance relevant in affected children and genetically at-risk infants. Other associated malignancies typically occur later in life but may present earlier than their sporadic counterparts, underscoring the importance of risk-appropriate, condition-specific surveillance strategies (Yen et al., 2022).

Evidence Discussion

- Imaging is not the primary modality for colorectal or duodenal surveillance in FAP, as endoscopy is required for detection, risk stratification, and management of adenomatous polyps. Imaging plays a supportive and adjunctive role in the evaluation of selected extracolonic malignancies and non-malignant complications associated with APC-associated polyposis conditions (Yen et al., 2022).
- Abdominal ultrasound is the recommended imaging modality for hepatoblastoma surveillance in infants and young children with FAP or in children known to carry a pathogenic APC variant. Surveillance is performed in conjunction with serial measurement of serum alpha fetoprotein. Ultrasound is non-ionizing and effective for

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detection of hepatic masses during the high-risk early childhood period (Yen et al., 2022).

- Thyroid ultrasound is used for surveillance of papillary thyroid carcinoma, which occurs at increased frequency in individuals with FAP, particularly adolescent and young adult females (Yen et al., 2022).
- Routine cross-sectional imaging (CT or MRI) is not considered medically necessary for cancer screening in asymptomatic individuals with FAP and is not recommended for routine surveillance due to limited benefit and potential cumulative exposure risks (Yen et al., 2022).
- Adrenal masses are more prevalent in individuals with FAP than in the general population and are most often identified incidentally. There is no evidence to support routine imaging-based screening of the adrenal glands in asymptomatic individuals with FAP; evaluation is generally symptom driven or prompted by incidental findings (Yen et al., 2022).
- In individuals with advanced duodenal polyposis, CT or MR enterography or video capsule endoscopy may be considered selectively to assess the extent of small bowel involvement. These imaging studies are adjunctive and do not replace endoscopic surveillance; use is based on disease severity and clinical judgment rather than routine screening indications (Yen et al., 2022).

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Multiple Endocrine Neoplasias (MEN) (PEDONC-2.8)

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Criteria

The following imaging studies should be considered medically necessary in individuals with MEN1:

Indication	Medically Necessary Imaging Study
All individuals with MEN1, beginning at age 8 years	• MRI Brain without and with contrast (CPT® 70553) every 3 years AND • Annual MRI Abdomen without and with MRI Pelvis without and with contrast (CPT® 74183 +/- 72197), OR CT Abdomen with contrast (CPT® 74160) OR CT Abdomen/Pelvis with contrast (CPT® 74177) AND • Annual MRI Chest without and with contrast (CPT® 71552) or CT Chest with contrast (CPT® 71260)
Known thyroid cancer in individuals with MEN1	• See: **Thyroid Cancer (ONC-6)** in the Oncology Imaging Guidelines
Known pheochromocytoma in individuals with MEN1	• See: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines

The following imaging studies should be considered medically necessary in individuals with MEN2a and MEN2b:

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Indication	Medically Necessary Imaging Study
• One of the following in individuals with MEN2a and MEN2b: ◦ Elevated catecholamines ◦ Inconclusive adrenal mass on MRI	• See: **Adrenal Lesions (PEDAB-17)**
• Known pheochromocytoma in individuals with MEN2a and MEN2b	• See: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)**

Background and Supporting Information

- MEN syndromes are autosomal dominant cancer predisposition disorders characterized by the development of multiple endocrine and neuroendocrine tumors, often at younger ages than sporadic counterparts. Affected individuals have a 50% risk of transmission to offspring, necessitating early, genotype- and phenotype-specific surveillance strategies (Eng & Plitt, 2023; Giusti, Marini, & Brandi, 2022).
- MEN syndromes also include additional hereditary endocrine tumor syndromes and phenocopies beyond MEN1 and MEN2, which can present with overlapping tumor types and influence surveillance strategies (Brandi et al., 2025; Del Rivero et al., 2025; Johnston et al., 2001).
- MEN1 is caused by pathogenic variants in the MEN1 gene and is classically characterized by parathyroid tumors, pancreatic neuroendocrine tumors (PNETs), and anterior pituitary adenomas ("the 3 P's"). Additional associated manifestations include thymic, bronchial, and gastric carcinoid tumors, adrenal lesions, and other endocrine and non-endocrine neoplasms (Giusti, Marini, & Brandi, 2022).
  - MEN1 is associated with significant morbidity and reduced life expectancy, with pancreatic neuroendocrine tumors representing the leading cause of disease-related mortality (Brandi et al., 2025; Del Rivero et al., 2025).
  - Tumor penetrance increases with age, with more than half of affected individuals developing manifestations by age 20 and over 90% by age 40. Many MEN1-associated tumors are clinically silent in early stages, supporting the use of targeted biochemical testing complemented by selective imaging for early identification (Giusti, Marini, & Brandi, 2022).
  - Earlier identification through genetic testing has led to detection of smaller, often indolent tumors, reinforcing the need for balanced surveillance strategies (Brandi et al., 2025; Del Rivero et al., 2025).

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- MEN2 is caused by activating pathogenic variants in the RET proto-oncogene and includes MEN2A, MEN2B, and familial medullary thyroid carcinoma (FMTC). All MEN2 subtypes are characterized by a high risk of medullary thyroid carcinoma (MTC), with age of onset varying by genotype and subtype (Eng & Plitt, 2023).
  - MEN2A is characterized by MTC, pheochromocytomas (often bilateral), and parathyrod adenomas or hyperplasia (Eng & Plitt, 2023).
  - MEN2B is associated with early-onset, aggressive MTC, mucosal neuromas, diffuse gastrointestinal ganglioneuromatosis, and a marfanoid habitus, frequently presenting in infancy or early childhood (Eng & Plitt, 2023).
  - Tumors in MEN2 are frequently multifocal, bilateral, and hormonally active, with potentially life threatening complications if unrecognized. Early identification supports timely surgical intervention, including genotype directed prophylactic thyroidectomy, and reduces morbidity related to metastatic or hormonally active disease (Eng & Plitt, 2023).
  - MEN2-associated pheochromocytomas are typically adrenal and adrenergic (epinephrine-producing), allowing for high sensitivity of biochemical screening. In contrast, SDHx-related tumors are often noradrenergic or dopaminergic and may include extra-adrenal paragangliomas, which are less reliably detected with biochemical testing alone and may require broader imaging approaches (Del Rivero et al., 2025; Geurts et al., 2020; Johnston et al., 2001).

Evidence Discussion

- In MEN syndromes, biochemical surveillance is the primary screening modality for most tumor types. Imaging is used selectively to localize disease following abnormal biochemical findings, evaluate extent of disease, or guide surgical planning, rather than for indiscriminate whole body screening (Eng & Plitt, 2023; Giusti, Marini, & Brandi, 2022). This selective approach reduces harms including radiation exposure, overdiagnosis of indolent tumors, and unnecessary procedures associated with lifelong surveillance (Brandi et al., 2025).
- MEN1
  - Imaging is not used for routine screening of MEN1-associated hyperparathyroidism, as diagnosis is based on biochemical hypercalcemia and elevated parathyroid hormone levels. Localization studies are reserved for pre-operative planning or recurrent disease (Giusti, Marini, & Brandi, 2022). This avoids unnecessary imaging in multiglandular disease where localization studies have limited diagnostic value outside of surgical planning (Del Rivero et al., 2025).
  - MRI of the brain is used at defined intervals for detection of pituitary adenomas. Cross-sectional abdominal imaging (CT, MRI, or endoscopic ultrasound) may be used periodically to evaluate for pancreatic neuroendocrine tumors in conjunction with biochemical surveillance but is not a substitute for laboratory monitoring (Giusti, Marini, & Brandi, 2022). MRI is often preferred in MEN1 surveillance due to

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its sensitivity and avoidance of ionizing radiation, which is important in individuals requiring lifelong imaging beginning in childhood (Brandi et al., 2025; Del Rivero et al., 2025).
    - Chest CT or MRI may be considered selectively for detection of thymic or bronchial carcinoid tumors in higher risk individuals (Giusti, Marini, & Brandi, 2022). Selective thoracic imaging balances early detection of higher-risk tumors with the risks of cumulative radiation exposure, as only a subset of individuals develop these malignancies (Brandi et al., 2025).
- MEN2
    - For individuals with MEN2A or MEN2B, recommended screening includes annual biochemical testing for pheochromocytoma using plasma free metanephrines or 24 hour urine fractionated metanephrines, beginning at an age determined by the specific RET pathogenic variant risk category (Eng & Plitt, 2023). This biochemical-first approach is supported by the high sensitivity of testing for adrenergic tumors in MEN2 (Del Rivero et al., 2025).
    - MRI of the abdomen is the preferred first-line imaging modality for localization of pheochromocytoma when biochemical results are abnormal, due to high sensitivity and avoidance of ionizing radiation (Eng & Plitt, 2023).
    - Advanced nuclear imaging (e.g., MIBG or PET based techniques) is not considered medically necessary for routine screening (Eng & Plitt, 2023). These modalities are reserved for select cases due to limited incremental benefit and potential harms from radiation exposure and false positives (Del Rivero et al., 2025).
    - Imaging for hyperparathyroidism in MEN2A is not used for screening purposes. Localization studies are performed only after biochemical hyperparathyroidism is confirmed, typically following management of thyroid disease, and are used to guide surgical planning (Eng & Plitt, 2023).
    - Differences between MEN2-associated and SDHx-related tumors further support selective imaging strategies, as MEN2 lesions are typically identified biochemically, whereas non-adrenergic or extra-adrenal tumors in other hereditary syndromes may require imaging for detection (Geurts et al., 2020; Johnston et al., 2001).

Health Equity Considerations

MEN, including MEN1 and MEN2, is a rare hereditary cancer syndrome that requires lifelong, protocolized imaging surveillance beginning in childhood or adolescence. Disparities in access to specialized endocrine and oncologic care, genetic testing, and longitudinal imaging follow-up can significantly affect outcomes. Because MEN-associated tumors often develop silently over time, delayed diagnosis or inconsistent surveillance disproportionately increases the risk of advanced disease at presentation. Structural barriers such as limited access to high-volume specialty centers, insurance instability, and geographic distance to imaging facilities are especially relevant

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for patients from lower socioeconomic backgrounds and medically underserved communities, potentially leading to gaps in guideline-concordant tumor screening (Diaz-Thomas et al., 2023; van Leeuwaarde et al., 2020).

Financial toxicity and employment disruption are key equity concerns in MEN, particularly MEN1, where patients frequently undergo repeated imaging, biochemical testing, and surgical interventions over decades. In a large U.S. cohort, the majority of adults with MEN1 reported substantial financial burden related to their condition, including unemployment, high out-of-pocket medication costs, and adverse financial events such as debt or bankruptcy. These financial stressors were strongly associated with worse health-related quality of life across multiple physical and psychosocial domains, underscoring how economic instability can impair adherence to surveillance recommendations and ongoing care (Peipert et al., 2017). Imaging guidelines that minimize unnecessary variation while maintaining adequate surveillance may help reduce cumulative cost burden and support more equitable long-term management.

Psychosocial and educational factors further intersect with health equity in MEN. Employment status has consistently emerged as a major determinant of quality of life in MEN1, with unemployed individuals experiencing significantly worse outcomes regardless of tumor burden. Additionally, discrepancies between individuals' understanding of their disease status and documented tumor findings have been observed, suggesting gaps in health literacy and communication that may be exacerbated in populations facing language barriers or limited access to culturally responsive care (van Leeuwaarde et al., 2020). Standardized, evidence-based imaging pathways for MEN can help mitigate disparities by promoting consistent surveillance independent of socioeconomic status, while reinforcing the importance of multidisciplinary care models, patient education, and structural supports that address financial and psychosocial barriers (Diaz-Thomas et al., 2023).

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Tuberous Sclerosis Complex (TSC) (PEDONC-2.9)

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Criteria

- Abdominal MRI (CPT® 74183) is considered medically necessary for women of childbearing age planning pregnancy.

The following imaging studies should be considered medically necessary in individuals with TSC:

Indication	Medically Necessary Imaging Study
• All individuals with TSC, at the time of suspected diagnosis until age 25 years	• Annual Brain MRI without and with contrast (CPT® 70553)
• All individuals at diagnosis of TSC	• Single baseline MRI Abdomen without and with contrast (CPT® 74183)
• If no renal lesions seen on baseline MRI Abdomen in individuals with TSC	• From diagnosis through age 11: ◦ Annual Renal US (CPT® 76770) • Age 12 (or 10 years earlier than the youngest family member with renal cell carcinoma, whichever comes earlier): ◦ MRI Abdomen without and with contrast (CPT® 74183) annually in lieu of ultrasound
• For documented renal lesions on baseline MRI Abdomen or any ultrasound in individuals with TSC	• MRI Abdomen without and with contrast (CPT® 74183) annually
• All individuals with TSC, beginning at age 18 years	• CT Chest without contrast (CPT® 71250) every 5 years
• All individuals with TSC, for cardiac screening or follow up of known cardiac disease	• See: **Initial Transthoracic Echocardiography (TTE) Indications (PEDCD-8.2)** and **Repeat Transthoracic Echocardiography Indications (PEDCD-8.3)** in the Pediatric Cardiology Imaging Guidelines

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Indication	Medically Necessary Imaging Study
• Individuals with TSC with documented abnormalities on baseline CT Chest	• Additional CT Chest without contrast or with contrast (CPT® 71250 or 71260) every 1 year
• Any of the following in individuals with TSC: ◦ New pulmonary symptoms ◦ Worsening pulmonary function testing	• CT Chest without contrast (CPT® 71250)
• Known subependymal giant cell astrocytoma (SEGA) tumors in individuals with TSC	• See: **Intracranial Low Grade Gliomas (LGG) (PEDONC-4.2)**
• Known renal cell carcinoma in individuals with TSC	• See: **Pediatric Renal Cell Carcinoma (RCC) (PEDONC-7.4)**

Background and Supporting Information

- TSC is a multisystem genetic disorder caused by pathogenic variants in TSC1 or TSC2 and is inherited in an autosomal dominant manner with a 50% risk to offspring; disease penetrance is high but clinical expression is variable (Northrup et al., 2024).
- TSC affects approximately 1 in 6,000 individuals and commonly presents in childhood, necessitating long term surveillance strategies beginning early in life (Northrup et al., 2024).
- Individuals with TSC are predisposed to benign and malignant tumors involving the brain, kidneys, lungs, and heart, including SEGAs, renal angiomyolipomas, renal cell carcinoma, pulmonary lymphangioleiomyomatosis (LAM), and cardiac rhabdomyomas (Northrup et al., 2024).
  - SEGAs arise from subependymal nodules and may cause obstructive hydrocephalus; these tumors often grow silently, making scheduled neuroimaging an integral part of management (Northrup et al., 2024).
  - Renal angiomyolipomas and cystic disease are common and progressive, while renal cell carcinoma, though uncommon, occurs at younger ages than sporadic RCC, supporting renal imaging surveillance across the lifespan (Northrup et al., 2024).
  - Pulmonary LAM primarily affects females and may remain asymptomatic until advanced disease develops, justifying periodic pulmonary imaging in adulthood rather than symptom only evaluation (Northrup et al., 2024).

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Evidence Discussion

- Longitudinal brain MRI enables early detection of SEGA growth prior to hydrocephalus or neurologic deterioration, allowing timely initiation of medical therapy or surgical intervention and reducing associated morbidity (Northrup et al., 2024).
- Serial renal imaging identifies angiomyolipoma growth and early malignant transformation, facilitating nephron-sparing interventions and mitigation of hemorrhage and renal insufficiency risks (Northrup et al., 2024).
- Periodic chest imaging in individuals at risk for LAM allows recognition of cystic lung disease before development of pneumothorax or respiratory failure, conditions that may otherwise present abruptly (Northrup et al., 2024).
- TSC-associated lesions demonstrate age-specific patterns of onset and progression, supporting tailored imaging strategies rather than indiscriminate or whole body screening imaging (Northrup et al., 2024).
- The clinical benefit of early tumor detection and prevention of irreversible organ damage outweighs the potential harms of repeated imaging when surveillance is targeted, modality appropriate, and performed at defined intervals (Northrup et al., 2024).

Health Equity Considerations

TSC is a rare, lifelong, multisystem genetic condition that imposes a disproportionate medical, psychosocial, and economic burden on affected children and their families, with important implications for health equity. Individuals with TSC require frequent surveillance imaging, specialty care across multiple organ systems, and ongoing neurodevelopmental and psychiatric assessment, resulting in high healthcare utilization and complexity of care (Rentz et al., 2015; Jansen et al., 2020). Access to comprehensive, multidisciplinary TSC clinics is uneven, with many families living significant distances from specialized centers, contributing to delays in diagnosis, inconsistent follow-up imaging, and fragmented care, particularly for patients reliant on public insurance or residing in rural or underserved areas (Rentz et al., 2015; Jansen et al., 2020). These structural barriers may lead to under-surveillance of clinically significant complications, including renal, neurologic, and pulmonary manifestations, thereby exacerbating health disparities.

Social determinants of health further compound inequities in this population. High rates of TSC associated neuropsychiatric disorders, epilepsy, intellectual disability, and autism spectrum disorder significantly disrupt educational attainment, employment, and caregiver workforce participation, disproportionately affecting families with fewer socioeconomic resources (Jansen et al., 2020; Sforza et al., 2026). Caregivers of children with TSC frequently report substantial out of pocket expenses, lost workdays, and unmet needs for psychological and social support, with greater burden observed in families managing epilepsy and neurodevelopmental comorbidities (Rentz et al.,

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2015; Sforza et al., 2026). Despite the high prevalence of psychiatric symptoms, mental health evaluation and treatment remain underutilized, reflecting disparities in access to behavioral health services and limited integration of psychosocial screening into routine TSC care (Rai & Sandefur, 2024; Jansen et al., 2020). Equity-focused imaging and surveillance strategies for TSC should therefore emphasize guideline-concordant, age-appropriate monitoring that accounts for barriers to specialty access, supports coordinated multidisciplinary care, and minimizes avoidable delays or disparities in diagnosis and ongoing disease management.

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Von Hippel-Lindau Syndrome (VHL) (PEDONC-2.10)

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Criteria

The following imaging studies are considered medically necessary in individuals with VHL:

Indication	Medically Necessary Imaging Study
• All individuals with VHL, beginning at age 11 years	• MRI Brain without and with contrast (CPT® 70553) and MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, and Lumbar-CPT® 72158) every 2 years
• Individuals with VHL with frequent ear infections, prior to age 8	• One-time MRI Brain without and with contrast (CPT® 70553)
• All individuals with VHL, beginning at age 5 years	• Annual Abdominal US (CPT® 76700)
• All individuals with VHL, beginning at age 15 years	• MRI Abdomen without and with contrast (CPT® 74183) every 2 years
• Individuals with VHL with suspected pheochromocytoma as indicated by **ONE** of the following: ◦ Elevated catecholamines ◦ Inconclusive adrenal mass on MRI	• Octreotide study (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804) OR • Adrenal Nuclear imaging study (CPT® 78075) OR • Dotatate PET (CPT® 78815 or CPT® 78816)
• Individuals with VHL with known hemangioblastoma anywhere in the body (based on imaging) that has not been resected	• Both of the following, every 1 year: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, and Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
• Known hemangioblastoma that has not been resected and new or worsening symptoms in individuals with VHL	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, and Lumbar-CPT® 72158)
• Known (based on imaging) CNS hemangioblastoma in individuals with VHL	• See: **Intracranial Low Grade Gliomas (LGG) (PEDONC-4.2)**
• Known renal cell carcinoma in individuals with VHL	• See: **Pediatric Renal Cell Carcinoma (RCC) (PEDONC-7.4)**
• Known pheochromocytoma or other neuroendocrine tumor in individuals with VHL	• See: **Neuroendocrine Cancers And Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines
• New abnormality is detected on MRI Brain in individuals with VHL	• A repeat MRI Brain without and with contrast (CPT® 70553) should be done in 6 months. • If stable, imaging should return to every 2 years starting 2 years from the prior study
• New abnormality is found in the pancreas on a screening MRI Abdomen in individuals with VHL	• Repeat MRI Abdomen without and with contrast (CPT® 74183) in 6 months then annually from initial scan to observe for development of pNET

Background and Supporting Information

- VHL is an autosomal dominant cancer predisposition syndrome caused by pathogenic variants in the VHL tumor suppressor gene, conferring a 50% risk of inheritance and high lifetime penetrance (van Léeuwaarde et al., 2025).
- VHL is characterized by multisystem tumor development, including central nervous system (CNS) hemangioblastomas, retinal hemangioblastomas, clear cell renal cell carcinoma (RCC), pheochromocytomas and paragangliomas, pancreatic cysts and neuroendocrine tumors, and endolymphatic sac tumors (van Léeuwaarde et al., 2025).
- CNS hemangioblastomas arise in the cerebellum, brainstem, and spinal cord and may remain asymptomatic until causing mass effect or neurologic compromise; retinal hemangioblastomas may present in childhood and can cause irreversible vision loss if untreated (van Léeuwaarde et al., 2025).
- Clear cell RCC develops in approximately 70% of individuals with VHL and is the leading cause of disease related mortality, often occurring at younger ages than

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sporadic RCC and frequently in a multifocal or bilateral pattern (van Léeuwaarde et al., 2025).
- Pheochromocytomas may be clinically silent or present with episodic hypertension, while endolymphatic sac tumors may cause sudden or progressive hearing loss, underscoring the role of biochemical and imaging surveillance prior to symptom onset (van Léeuwaarde et al., 2025).
- Implementation of systematic surveillance protocols for VHL has been associated with significant improvements in life expectancy and reductions in morbidity compared with historical cohorts lacking routine screening (van Léeuwaarde et al., 2025).

Evidence Discussion

- Periodic MRI of the brain and spine facilitates early detection of hemangioblastomas before neurologic deterioration, enabling timely surgical or medical intervention and reducing irreversible neurologic morbidity (van Léeuwaarde et al., 2025).
- Regular ophthalmologic evaluation allows identification of retinal hemangioblastomas at early stages, when treatment can preserve vision and prevent blindness, outcomes not achievable once advanced complications occur (van Léeuwaarde et al., 2025).
- Longitudinal abdominal imaging supports early recognition and size-based management of RCC, which correlates with improved survival and nephron preservation in individuals with hereditary VHL-associated renal tumors (van Léeuwaarde et al., 2025).
- Scheduled biochemical testing identifies pheochromocytomas prior to clinical presentation, reducing the risk of hypertensive crises and perioperative complications through planned surgical management (van Léeuwaarde et al., 2025).
- Serial audiologic monitoring detects early hearing changes related to endolymphatic sac tumors, allowing targeted imaging and intervention before permanent hearing loss develops (van Léeuwaarde et al., 2025).
- Evidence supports that structured, organ-specific surveillance in VHL yields substantial clinical benefit by preventing advanced disease, while limiting harm through targeted imaging rather than indiscriminate or symptom-only evaluation (van Léeuwaarde et al., 2025).

Health Equity Considerations

VHL syndrome is a rare, inherited cancer predisposition disorder that requires lifelong, intensive imaging surveillance and repeated specialty interventions across multiple organ systems, creating significant equity concerns. Because VHL is uncommon and lacks a dedicated ICD diagnosis code, delays in recognition and diagnosis are common, particularly outside of specialized hereditary cancer or academic centers, which may disproportionately affect individuals from rural, underserved, or lower resource settings (Jonasch et al., 2024). Management typically involves frequent MRI-based surveillance of the brain, spine, abdomen, and other organs, as well as repeated surgical procedures

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over an individual's lifetime. Claims based data demonstrate markedly higher healthcare utilization and annual costs for individuals with VHL-associated central nervous system hemangioblastomas and pancreatic neuroendocrine tumors compared with matched controls, reflecting intensive inpatient, outpatient, and procedural care requirements (Jonasch et al., 2024). Limited access to specialty imaging facilities and multidisciplinary expertise may therefore result in delayed detection of tumors, inconsistent surveillance, or increased morbidity in socioeconomically disadvantaged populations.

Financial- and insurance-related barriers further exacerbate disparities in VHL care. Individuals with VHL-associated tumors incur substantial excess annual healthcare costs driven largely by imaging, hospitalizations, and tumor related surgeries, with surgical admissions and treatment-related complications representing particularly high-cost events (Jonasch et al., 2024). These burdens may be especially challenging for families with high deductible plans, limited insurance coverage, or reliance on public insurance programs, potentially leading to deferred imaging or gaps in recommended surveillance. Although emerging systemic therapies, such as HIF 2α inhibition, may reduce the frequency of surgeries for select individuals, equitable access to advanced imaging and novel treatments remains uneven (Jonasch et al., 2024). Equity-focused imaging strategies for VHL should therefore prioritize guideline-concordant surveillance across the lifespan, consider cumulative financial and logistical burdens, and support coordinated, multidisciplinary care pathways to reduce disparities in early tumor detection and long term outcomes.

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Rhabdoid Tumor Predisposition Syndrome (PEDONC-2.11)

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Criteria

The following imaging studies should be considered medically necessary in individuals with Rhabdoid Tumor Predisposition Syndrome:

Indication	Medically Necessary Imaging Study
• All individuals with rhabdoid tumor predisposition syndrome, at diagnosis, as early as birth if requested	• Whole-body MRI (WBMRI) (CPT® 76498)
• All individuals with rhabdoid tumor predisposition syndrome, from birth to 6 months of age	• ALL of the following, monthly: ◦ US Head (CPT® 76506) ◦ US Abdomen (CPT® 76700) ◦ US Pelvis (CPT® 76856) ◦ US Neck (CPT® 76536) ◦ MRI without and with contrast of areas of concern found on baseline WBMRI
• All individuals with rhabdoid tumor predisposition syndrome, from age 7 months to 5 years	• ALL of the following, every 3 months: ◦ US Abdomen (CPT® 76700) ◦ US Pelvis (CPT® 76856) ◦ US Neck (CPT® 76536) ◦ MRI Brain (CPT® 70553) ◦ MRI Spine (CPT® 72156, CPT® 72157, and CPT® 72158) without and with contrast ◦ MRI without and with contrast of areas of concern found on baseline WBMRI
• All individuals with rhabdoid tumor predisposition syndrome, after age 5 years	• Annual WBMRI (CPT® 76498)

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Indication	Medically Necessary Imaging Study
• Clinical symptoms or WBMRI findings suggesting malignancy in individuals with rhabdoid tumor predisposition syndrome	• Targeted advanced imaging of the suspected disease site (CT with or without contrast, or MRI without and with contrast)
• Inconclusive findings on ultrasound in individuals with rhabdoid tumor predisposition syndrome	• MRI without and with contrast of the inconclusive US site ◦ MRI is then considered medically necessary in place of ultrasound for remainder of planned screening

Background and Supporting Information

- Rhabdoid Tumor Predisposition Syndrome (RTPS) is a hereditary cancer predisposition syndrome caused by heterozygous germline pathogenic variants in SMARCB1 (RTPS1) or SMARCA4 (RTPS2), affecting members of the SWI/SNF chromatin remodeling complex (Nemes et al., 2022).
- RTPS is inherited in an autosomal dominant manner with a 50% risk to offspring; penetrance is extremely high for SMARCB1-related RTPS in early childhood and incomplete for SMARCA4-related RTPS, contributing to variable family histories (Nemes et al., 2022).
- RTPS is associated with highly aggressive malignant rhabdoid tumors arising in the central nervous system as atypical teratoid/rhabdoid tumors (ATRT), the kidney as rhabdoid tumor of the kidney, and multiple extracranial soft tissue sites; small cell carcinoma of the ovary, hypercalcemic type (SCCOHT) is specifically associated with SMARCA4 variants (Nemes et al., 2022).
- Most affected individuals present in infancy, with more than 70% developing tumors before 12 months of age, often with synchronous or multifocal tumors that demonstrate rapid growth and aggressive clinical behavior (Nemes et al., 2022).
- Rhabdoid tumors can occur in nearly any anatomic location, including brain, spine, kidney, liver, mediastinum, pelvis, and soft tissues; tumors may be clinically silent until advanced, supporting comprehensive imaging rather than symptom-based evaluation alone (Nemes et al., 2022).
- Although overall prognosis remains poor, early tumor detection and timely initiation of therapy have been associated with improved survival in select individuals with RTPS, particularly those identified through predisposition surveillance (Nemes et al., 2022).

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Evidence Discussion

- The extremely early age of onset and high risk of synchronous tumors support frequent, structured imaging in infancy and early childhood, allowing detection before clinical deterioration and metastatic spread (Nemes et al., 2022).
- Whole body MRI enables assessment of both CNS and extracranial tumor sites in a single session, improving detection of multifocal disease that may be missed with region-limited imaging strategies (Nemes et al., 2022).
- Regular brain and spine MRI permits early identification of ATRT, which often arises in the cerebellum and spinal axis and may progress rapidly, enabling earlier treatment planning and improved neurologic outcomes (Nemes et al., 2022).
- Abdominal and neck ultrasound provides a radiation-free modality for identifying extracranial tumors in young children and serves as an appropriate first line imaging tool for frequent surveillance in high risk infants (Nemes et al., 2022).
- Because affected individuals are typically infants and young children with extreme cancer susceptibility, limiting exposure to ionizing radiation is critical; MRI- and ultrasound- based surveillance strategies reduce long-term risks associated with cumulative radiation exposure (Nemes et al., 2022).
- Although surveillance requires frequent imaging and may involve anesthesia in young children, the substantial benefit of detecting aggressive tumors at a treatable stage outweighs these risks in individuals with RTPS (Nemes et al., 2022).

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Familial Retinoblastoma Syndrome (PEDONC-2.12)

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Criteria

- Regular physical and ophthalmologic evaluations under anesthesia (EUA) are the hallmark of surveillance strategies for these individuals, and asymptomatic screening imaging does not have a defined role at this time.

The following imaging studies should be considered medically necessary in individuals with Familial Retinoblastoma Syndrome:

Indication	Medically Necessary Imaging Study
• Individuals with familial retinoblastoma syndrome with retinomas (premalignant retinal lesions)	• Annual MRI Orbits (CPT® 70543) without and with contrast
• Individuals with familial retinoblastoma syndrome and either of the following: ◦ Inconclusive EUA findings ◦ New symptoms	• US Orbits (CPT® 76512, 76510, or 76511) or MRI Orbits (CPT® 70543) ◦ These studies should be used if at all possible in lieu of CT or nuclear imaging to avoid radiation exposure

Background and Supporting Information

- Familial (heritable) retinoblastoma syndrome is an autosomal dominant cancer predisposition syndrome caused by a heterozygous germline pathogenic variant in RB1, conferring a 50% risk of transmission to offspring (Lohmann & Gallie, 2023).
- Retinoblastoma is a malignant tumor of the developing retina that typically presents in early childhood, most often before age five years, with bilateral and multifocal disease strongly associated with germline RB1 pathogenic variants (Lohmann & Gallie, 2023).
- Tumors arise from retinal cone precursor cells and may be unilateral, bilateral, or multifocal; intracranial midline tumors of the pineal region (trilateral retinoblastoma) represent an important anatomic extension relevant to neuroimaging surveillance (Lohmann & Gallie, 2023).
- Individuals with heritable retinoblastoma have a markedly increased lifetime risk of subsequent malignant neoplasms, particularly osteosarcoma, soft tissue sarcomas, and melanoma, often presenting in adolescence or adulthood (Lohmann & Gallie, 2023).

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- Germline RB1 pathogenic variants are associated with significantly increased susceptibility to radiation-induced malignancies, particularly following external beam radiation therapy, supporting avoidance of ionizing radiation when possible (Lohmann & Gallie, 2023).
- Genetic risk categories based on germline RB1 status (e.g., confirmed germline variant vs. reduced residual risk due to mosaicism) inform intensity and duration of ophthalmologic and imaging surveillance without relying on symptoms alone (Lohmann & Gallie, 2023).

Evidence Discussion

- Frequent ocular evaluation in early childhood facilitates detection of small, asymptomatic retinal tumors, enabling vision sparing treatment and reducing the risk of metastatic spread (Lohmann & Gallie, 2023).
- MRI is effective for evaluating intraocular tumor extent, optic nerve involvement, and intracranial disease, including pinealoblastoma, while avoiding ionizing radiation exposure associated with CT (Lohmann & Gallie, 2023).
- Neuroimaging surveillance allows early identification of pineal or suprasellar tumors, which are often clinically occult and carry a poor prognosis if diagnosed late (Lohmann & Gallie, 2023).
- Limiting diagnostic imaging that uses ionizing radiation reduces cumulative exposure and mitigates the substantially elevated risk of second primary malignancies in individuals with heritable retinoblastoma (Lohmann & Gallie, 2023).
- Imaging and examination strategies tailored to genetic risk balance early cancer detection with minimization of sedation, radiation exposure, and unnecessary testing, aligning benefit with disease biology (Lohmann & Gallie, 2023).
- Although surveillance in young children may require anesthesia and repeated examinations, the benefit of preventing vision loss, detecting life threatening tumors early, and reducing overall cancer mortality outweighs these risks in high-risk individuals (Lohmann & Gallie, 2023).

Health Equity Considerations

Familial retinoblastoma syndrome is a rare, inherited pediatric cancer predisposition disorder that requires early detection, intensive ophthalmic imaging, and longitudinal surveillance, raising important health equity considerations. Timely diagnosis is critical, as disease severity at presentation strongly influences eye salvage, visual outcomes, and treatment intensity. Evidence indicates that children with paternally inherited RB1 mutations present at significantly older ages, with larger tumors and more advanced International Classification of Retinoblastoma groups, and are more likely to require enucleation compared with those with maternally inherited disease (Eiger Moscovich et al., 2024). While parental origin reflects underlying epigenetic and imprinting effects, delayed presentation may also intersect with socioeconomic and access related factors.

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Notably, paternal inheritance cases in the cohort were more frequently observed among African American individuals, suggesting that structural barriers to early ophthalmic evaluation, genetic counseling, or specialty referral may contribute to inequities in presentation severity despite adjustment for race in multivariable analyses (Eiger Moscovich et al., 2024).

Access to specialized care further influences equity in familial retinoblastoma. Optimal management relies on repeated examinations under anesthesia, high resolution ocular imaging, and coordinated care within tertiary ocular oncology centers. Families with limited geographic access, financial constraints, or inadequate insurance coverage may face delays in screening of at risk infants, inconsistent follow up, or limited access to globe sparing therapies. The study highlights that some families declined or were unable to obtain genetic testing due to financial limitations, underscoring disparities in access to molecular diagnostics that are essential for risk stratification, surveillance planning, and counseling of unaffected relatives (Eiger Moscovich et al., 2024). Equity focused imaging guidelines for familial retinoblastoma should therefore emphasize early, guideline-concordant screening of genetically at-risk children, reduce barriers to specialty imaging and genetic services, and support consistent surveillance across socioeconomic and racial groups to prevent avoidable vision loss and morbidity.

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Hereditary Paraganglioma-Pheochromocytoma (HPP) Syndromes (PEDONC-2.13)

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Criteria

- Individuals with multiple endocrine neoplasias should not use this guideline and should be imaged according to **Multiple Endocrine Neoplasias (MEN) (PEDONC-2.8)**.

The following imaging studies should be considered medically necessary in individuals with HPP Syndromes:

Indication	Medically Necessary Imaging Study
• All individuals with HPP syndromes with SDHx (SDHA, SDHB, SDHC, SDHD), MAX, TMEM127 mutations, beginning at age 6	• Every 2 years, ONE of the following sets of imaging: ◦ Whole-body MRI (CPT® 76498) ▪ CPT® 76498 is the only code for whole-body MRI at this time OR ◦ MRI Neck without and with contrast (CPT® 70543), MRI Chest without and with contrast (CPT® 71552), MRI Abdomen without and with contrast (CPT® 74183), and MRI Pelvis without and with contrast (CPT® 72197) ▪ If MRI cannot be performed: CT Neck with contrast (CPT® 70491), CT Chest with contrast (CPT® 71260), and CT Abdomen and Pelvis with contrast (CPT® 74177) ▪ MRI Neck imaging should include skull base, thus separate MRI Brain (CPT® 70553) without and with contrast is only considered medically necessary if there are CNS-specific symptoms.
• Initial screening for individuals diagnosed with HPP syndromes at age 18 or older	• One-time PET/CT (CPT® 78815 or 78816), with 68Ga-DOTA-SSAs ◦ FDG may be substituted if Dotatate radiotracers are not available

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Indication	Medically Necessary Imaging Study
• Known pheochromocytoma or other neuroendocrine tumors in individuals with HPP syndromes	• See: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines

Background and Supporting Information

- HPP syndromes are autosomal dominant cancer predisposition syndromes caused by germline pathogenic variants in SDHA, SDHB, SDHC, SDHD, SDHAF2, MAX, or TMEM127, resulting in increased risk for paragangliomas and pheochromocytomas arising from neural crest–derived paraganglial tissue (Else et al., 2023).
- HPP syndromes are inherited in an autosomal dominant manner with a 50% risk of transmission to offspring, with notable parent of origin effects for SDHD, SDHAF2, and possibly MAX, which influence disease penetrance and phenotype (Else et al., 2023).
- Paragangliomas may arise anywhere along the paravertebral axis from the skull base to the pelvis, while pheochromocytomas are confined to the adrenal medulla; head and neck paragangliomas are typically parasympathetic and non-secretory, whereas sympathetic paragangliomas and pheochromocytomas often secrete catecholamines (Else et al., 2023).
- In addition to paragangliomas and pheochromocytomas, HPP syndromes are associated with increased risk for metastatic disease (particularly in SDHB carriers), gastrointestinal stromal tumors, clear cell renal cell carcinoma, and less commonly pulmonary chondromas (Else et al., 2023).
- Tumors in HPP syndromes may present in childhood or adulthood, with variable penetrance and risk of metachronous or multifocal disease, necessitating lifelong biochemical and imaging surveillance (Else et al., 2023).
- Multiple expert consensus groups recommend genetic evaluation and ongoing surveillance for individuals with HPP syndromes due to the high prevalence of occult, multifocal, or recurrent disease and the inability of pathology alone to distinguish localized from metastatic tumors (Else et al., 2023).

Evidence Discussion

- Paragangliomas may arise at multiple anatomic sites and remain clinically silent for prolonged periods; cross-sectional imaging enables early detection of occult tumors before development of symptoms, mass effect, or metastatic spread (Else et al., 2023).
- MRI is favored over CT for routine surveillance, particularly in pediatric and young adult populations, to minimize cumulative radiation exposure given the need for

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repeated, lifelong imaging while maintaining high sensitivity for soft tissue tumors (Else et al., 2023).

- Regular measurement of plasma-free or urine fractionated metanephrines complements imaging by identifying catecholamine secreting tumors that may be radiographically occult or newly developing, enhancing overall surveillance effectiveness (Else et al., 2023).
- Functional imaging using somatostatin receptor-based PET (e.g., ^{68}Ga DOTATATE) provides high sensitivity for lesion detection and disease staging, particularly in metastatic or multifocal disease, and is supported by international expert consensus when clinically indicated (Else et al., 2023).
- Although surveillance involves repeated imaging and laboratory evaluation, early tumor detection enables curative surgical resection, reduces morbidity from catecholamine excess, and may prevent progression to metastatic disease, outweighing the potential harms of screening (Else et al., 2023).
- Imaging frequency and modality selection are supported by evidence demonstrating variable metastatic risk by genotype, particularly the higher malignancy risk associated with SDHB, justifying tailored imaging strategies rather than symptom-based evaluation alone (Else et al., 2023).

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Costello Syndrome (PEDONC-2.14)

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Criteria

The following imaging studies should be considered medically necessary in individuals with Costello Syndrome:

Indication	Medically Necessary Imaging Study
• Following confirmation of gene mutation in individuals with Costello syndrome	• ANY or ALL of the following: ◦ Echocardiogram ▪ CPT® 93306 or ▪ CPT® 93308 with 93321 and 93325 ◦ MRI Brain (CPT® 70553) without and with contrast ◦ MRI Cervical (CPT® 72156) and Thoracic Spine (CPT® 72157) without and with contrast
• All individuals with Costello syndrome, from birth to 10th birthday	• Every 3 months: ◦ US Abdomen (CPT® 76700) and Pelvis (CPT® 76856)
• Known cardiac disease in individuals with Costello syndrome	• See: **Initial Transthoracic Echocardiography (TTE) Indications (PEDCD-8.2)** and **Repeat Transthoracic Echocardiography Indications (PEDCD-8.3)** in the Pediatric Cardiology Guidelines
• Known rhabdomyosarcoma in individuals with Costello syndrome	• See: **Rhabdomyosarcoma (RMS) (PEDONC-8.2)**
• Known neuroblastoma in individuals with Costello syndrome	• See: **Neuroblastoma (PEDONC-6)**

Background and Supporting Information

- Costello syndrome is a multisystem RASopathy caused by activating heterozygous pathogenic variants in the HRAS gene, leading to dysregulation of the Ras/MAPK signaling pathway and abnormal cellular growth, differentiation, and oncogenic risk (Gripp & Weaver, 2023).

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- Costello syndrome is inherited in an autosomal dominant manner and is most commonly due to a de novo HRAS pathogenic variant; affected individuals with classic phenotypes rarely reproduce, though vertical transmission has been reported in rare attenuated cases (Gripp & Weaver, 2023).
- Individuals with Costello syndrome have an estimated 15% lifetime risk of malignancy, with embryonal rhabdomyosarcoma and neuroblastoma predominating in infancy and early childhood, and transitional cell carcinoma of the bladder occurring in adolescence and adulthood (Gripp & Weaver, 2023).
- Central nervous system abnormalities are common and may include progressive postnatal cerebellar overgrowth, Chiari I malformation, hydrocephalus, and syringomyelia; genitourinary tumors and abdominal soft tissue malignancies represent key extracranial imaging targets (Gripp & Weaver, 2023).
- The phenotypic range extends from mild or attenuated forms to severe presentations with early lethal cardiomyopathy or neurologic complications, supporting risk-based surveillance rather than symptom-driven evaluation alone (Gripp & Weaver, 2023).
- Published clinical management guidelines for Costello syndrome recommend structured surveillance for malignancy and neurologic complications due to the recognized tumor risk and progressive anatomic abnormalities that may be clinically occult (Gripp & Weaver, 2023).

Evidence Discussion

- Many malignancies associated with Costello syndrome, particularly rhabdomyosarcoma and neuroblastoma, present early in life and may be asymptomatic; periodic abdominal and pelvic imaging enables earlier detection that may improve treatment options and outcomes (Gripp & Weaver, 2023).
- Progressive cerebellar overgrowth and posterior fossa crowding can lead to Chiari I malformation, hydrocephalus, or syringomyelia, which may evolve over time; neuroimaging allows detection prior to irreversible neurologic compromise (Gripp & Weaver, 2023).
- Transitional cell carcinoma of the bladder occurs at a markedly younger age in individuals with Costello syndrome than in the general population, justifying surveillance strategies that include imaging or urinalysis triggered evaluation rather than symptom based detection alone (Gripp & Weaver, 2023).
- Biochemical screening for catecholamine metabolites has not demonstrated utility for detecting neuroblastoma in Costello syndrome due to frequent false elevations in the absence of tumor, supporting imaging-based approaches when surveillance is pursued (Gripp & Weaver, 2023).
- Although repeated imaging introduces considerations related to sedation and cumulative burden, the relatively high cancer risk, early age of onset, and potential for clinically silent progression support the net benefit of structured, age appropriate imaging surveillance (Gripp & Weaver, 2023).

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- Imaging recommendations are supported by genotype-driven penetrance data and observed cancer incidence, reinforcing a surveillance approach that balances early detection with minimization of unnecessary studies (Gripp & Weaver, 2023).

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Constitutional Mismatch Repair Deficiency (CMMRD or Turcot Syndrome) (PEDONC-2.15)

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Criteria

The following imaging studies should be considered medically necessary in individuals with CMMRD/Turcot Syndrome:

Indication	Medically Necessary Imaging Study
• All individuals, after CMMRD diagnosis is confirmed by genetic mutation	• MRI Brain without and with contrast (CPT® 70553) every 6 months
• All individuals with CMMRD, beginning at age 4 years	• Annual esophagogastroduodenoscopy and colonoscopy
• All individuals with CMMRD, beginning at age 6 years	• Annual whole-body MRI (CPT® 76498) ◦ 76498 is the only code for whole-body MRI at this time

Background and Supporting Information

- CMMRD is a highly penetrant pediatric cancer predisposition syndrome caused by autosomal recessive inheritance of biallelic pathogenic variants in mismatch repair genes (MSH2, MSH6, MLH1, or PMS2), leading to genomic instability and early, aggressive malignancies (Tabori et al., 2017).
- CMMRD is associated with a broad and severe malignancy spectrum, most commonly high-grade central nervous system tumors (malignant gliomas, embryonal tumors, medulloblastoma), hematologic malignancies (T cell lymphoblastic lymphoma and leukemia), and gastrointestinal cancers, often occurring in early childhood (Tabori et al., 2017).
- The median age at first cancer diagnosis in individuals with CMMRD is approximately 7–8 years, with many individuals developing multiple synchronous or metachronous malignancies during childhood and a median survival of less than three years after initial diagnosis (Tabori et al., 2017).
- Individuals with CMMRD universally develop gastrointestinal polyposis over time, frequently mimicking attenuated familial adenomatous polyposis, with progression to colorectal carcinoma often during childhood or adolescence (Tabori et al., 2017).

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- Central nervous system involvement is common and includes high-grade gliomas and embryonal tumors that may not be detected clinically until advanced; extracranial malignancies may arise in the abdomen, pelvis, bone, and soft tissues (Tabori et al., 2017).
- International expert groups recommend intensive, early, and multimodality imaging surveillance due to the extreme cancer risk and early onset in affected children (Tabori et al., 2017).

Evidence Discussion

- Central nervous system tumors are the most common malignancies in CMMRD and may occur during infancy; early and repeated brain MRI improves detection of tumors at a potentially treatable stage and outperforms ultrasound in sensitivity, even in young children (Tabori et al., 2017).
- The occurrence of diverse, non canonical tumors, including sarcomas and genitourinary malignancies, supports the use of whole body MRI as part of surveillance to detect clinically silent cancers across multiple organ systems (Tabori et al., 2017).
- Imaging and endoscopic surveillance allow early identification of polyps and carcinomas, enabling timely intervention such as polypectomy or surgery and reducing the likelihood of advanced colorectal cancer (Tabori et al., 2017).
- Hematologic malignancies lack highly sensitive imaging or laboratory screening tools; therefore, imaging strategies combined with clinical vigilance provide a pragmatic approach for early detection when routine laboratory testing is insufficient (Tabori et al., 2017).
- Although surveillance requires frequent imaging and may involve sedation in young children, the exceptionally high cancer penetrance, early age of onset, and fatal natural history of untreated disease strongly favor intensive imaging strategies (Tabori et al., 2017).
- Evidence from retrospective cohorts and expert consensus demonstrates that structured imaging surveillance, including brain MRI and whole body MRI, can identify tumors earlier and is justified by the severity and breadth of cancer risk in CMMRD (Tabori et al., 2017).

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Hereditary Leiomyomatosis and Renal Cell Cancer (HLRCC) (PEDONC-2.16)

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Criteria

The following imaging studies should be considered medically necessary in individuals with HLRCC:

Indication	Medically Necessary Imaging Study
• Beginning at age 8 years, individuals with HLRCC with at least ONE of the following: ◦ Documented fumarate hydratase (FH) gene mutation/variant consistent with HLRCC ◦ Histologically confirmed multiple cutaneous piloleiomyomas ◦ At least TWO of the following manifestations: ▪ Surgical treatment for symptomatic uterine leiomyomas before age 40 ▪ Type 2 papillary renal cell carcinoma or collecting duct renal carcinoma before age 40 ▪ A first-degree family member with either of the two above criteria	• MRI Abdomen without and with contrast (CPT® 74183), annually

Background and Supporting Information

- HLRCC is an autosomal dominant cancer predisposition syndrome caused by heterozygous pathogenic variants in the FH gene, which encodes fumarate hydratase, a key enzyme of the tricarboxylic acid cycle; loss of FH function results in tumorigenesis through metabolic dysregulation and pseudohypoxia signaling (PDQ Cancer Genetics Editorial Board, 2024).
- HLRCC is characterized by cutaneous leiomyomas, early-onset and often severe uterine leiomyomas in females, and a distinct form of renal cell carcinoma that is biologically aggressive and considered a unique renal tumor subtype (PDQ Cancer Genetics Editorial Board, 2024).

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- The lifetime risk of renal cell carcinoma (RCC) in individuals with HLRCC is generally estimated between 15% and 30%, with reported cases occurring from childhood through adulthood; renal cancers have been documented in individuals as young as 10–11 years of age (PDQ Cancer Genetics Editorial Board, 2024; Forde et al., 2020).
- HLRCC-associated RCCs are typically unilateral and solitary, often high grade at presentation, and demonstrate aggressive behavior with early metastatic potential, distinguishing them from other hereditary RCC syndromes (PDQ Cancer Genetics Editorial Board, 2024).
- Although not all mutation carriers develop RCC, the penetrance of non-renal manifestations is high and there is substantial intrafamilial and interfamilial variability, limiting the ability to identify individuals at highest risk without imaging surveillance (PDQ Cancer Genetics Editorial Board, 2024).
- Due to the aggressive growth pattern of HLRCC-associated RCC and the frequent presentation at advanced stages, expert groups and specialty societies recommend routine renal imaging surveillance, favoring modalities that allow early lesion detection while minimizing cumulative radiation exposure (PDQ Cancer Genetics Editorial Board, 2024).

Evidence Discussion

- Symptomatic HLRCC-associated RCCs frequently present at advanced stage (stage III-IV), at which point prognosis is poor; therefore, routine imaging surveillance is aimed at detecting small, localized tumors amenable to curative surgical management (Forde et al., 2020).
- Prospective data demonstrate that MRI screening identifies early stage RCCs in asymptomatic individuals with HLRCC, enabling intervention at stages associated with significantly improved survival compared with symptomatic detection (Forde et al., 2020).
- In a multicenter cohort, individuals diagnosed with stage I or II RCC had markedly longer survival than those diagnosed at stage III or IV, with all individuals presenting with advanced disease dying within three years, supporting early imaging-based detection strategies (Forde et al., 2020).
- Modeling based on observed outcomes suggests that approximately five individuals with HLRCC need to undergo renal MRI surveillance to prevent one RCC related death, reflecting a favorable benefit to burden ratio for imaging in this population (Forde et al., 2020).
- MRI is preferred for lifelong surveillance because it avoids ionizing radiation while maintaining sensitivity for small or subtle renal lesions, an important consideration given the early onset and need for repeated imaging in HLRCC (PDQ Cancer Genetics Editorial Board, 2024).
- Although routine imaging increases resource utilization and may detect incidental findings, the aggressive and often fatal natural history of untreated HLRCC-

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associated RCC supports a lower threshold for surveillance imaging compared with other hereditary renal cancer syndromes (PDQ Cancer Genetics Editorial Board, 2024; Forde et al., 2020).

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Other Renal Cell Cancer Predisposition Syndromes (PEDONC-2.17)

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Birt-Hogg-Dube Syndrome (BHDS)

Criteria

The following imaging studies should be considered medically necessary in individuals with BHDS:

Indication	Medically Necessary Imaging Study
• All individuals with BHDS, beginning at age 20 years	• MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) annually ◦ If no family history of renal tumors AND after 2 consecutive normal MRIs, MRI is considered medically necessary every 2 years

Background and Supporting Information

- BHDS is an autosomal dominant disorder caused by heterozygous pathogenic variants in the FLCN gene, which encodes folliculin, a tumor suppressor protein involved in cellular metabolism and growth signaling pathways (Sattler & Steinlein, 2024).
- BHDS is characterized by a triad of cutaneous fibrofolliculomas and related skin lesions, pulmonary cysts with increased risk for spontaneous pneumothorax, and renal tumors of varied histology, with wide intrafamilial and interfamilial variability in disease expression (Sattler & Steinlein, 2024).
- Characteristic skin findings include fibrofolliculomas, trichodiscomas, acrochordons, angiofibromas, oral papules, collagenomas, and epidermal cysts, which typically develop in adulthood and may increase in number over time but are usually absent in childhood (Sattler & Steinlein, 2024).
- Pulmonary cysts, predominantly located in the basal lung regions, are common in BHDS and confer a markedly increased lifetime risk of spontaneous pneumothorax, often presenting as the first clinical manifestation in adolescents or young adults (Sattler & Steinlein, 2024).

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- Individuals with BHDS have an estimated 15%–30% lifetime risk of renal cell carcinoma, representing approximately a seven fold increase over the general population; tumors are frequently bilateral and multifocal (Sattler & Steinlein, 2024).
- The most common BHDS-associated renal tumors are oncocytic hybrid tumors (chromophobe/oncocytoma), followed by chromophobe RCC, oncocytoma, and clear cell carcinoma; the median age of renal tumor diagnosis is approximately 50–55 years, though adolescent onset has been reported (Sattler & Steinlein, 2024).
- Because renal tumors may be clinically silent until advanced and cumulative radiation exposure is a concern, expert consensus guidelines recommend periodic cross-sectional renal imaging, favoring MRI for long-term surveillance (Sattler & Steinlein, 2024).

Evidence Discussion

- Renal tumors in BHDS can be bilateral, multifocal, and slow growing but unpredictably aggressive in some cases; routine imaging allows detection at a size amenable to nephron-sparing intervention and reduces the likelihood of advanced disease presentation (Sattler & Steinlein, 2024).
- MRI is preferred for renal surveillance due to its sensitivity for small renal lesions and avoidance of ionizing radiation, an important consideration given the need for lifelong imaging beginning in early adulthood (Sattler & Steinlein, 2024).
- Evidence supports monitoring renal tumors smaller than 3cm with imaging, as early detection enables timely nephron-sparing surgery once tumors exceed this threshold, preserving renal function while maintaining oncologic safety (Sattler & Steinlein, 2024).
- While lung cysts are common, routine serial chest CT in asymptomatic individuals is not recommended because of cumulative radiation risks (Sattler & Steinlein, 2024).
- The benefits of periodic renal imaging in BHDS outweigh potential harms, as MRI-based screening minimizes radiation exposure while addressing a substantially increased renal cancer risk that cannot be predicted by phenotype or genotype alone (Sattler & Steinlein, 2024).
- The clinical evidence underlying BHDS demonstrates that organ specific, risk adapted imaging, particularly for renal manifestations, provides a rational balance between early detection, avoidance of unnecessary procedures, and long-term safety (Sattler & Steinlein, 2024).

BAP1 Tumor Predisposition Syndrome

Criteria

The following imaging studies should be considered medically necessary in individuals with BAP1:

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Indication	Medically Necessary Imaging Study
• All individuals with BAP1, beginning at age 30 years	• Abdominal MRI without and with contrast (CPT® 74183) every 2 years
• All individuals with BAP1, beginning at age 18 years	The following studies are considered medically necessary every 2 years: • MRI Brain without and with contrast (CPT® 70553) • MRI Whole Spine without and with contrast (Cervical- CPT® 72156, Thoracic- CPT® 72157, Lumbar- CPT® 72158)

Background and Supporting Information

- BAP1 is an autosomal dominant cancer predisposition syndrome caused by heterozygous germline pathogenic variants in the BAP1 gene, which encodes a tumor suppressor involved in chromatin regulation, DNA damage response, and cell cycle control (Pilarski et al., 2024).
- BAP1 is associated with an increased risk of BAP1-inactivated melanocytic tumors, uveal melanoma, malignant mesothelioma, cutaneous melanoma, renal cell carcinoma, basal cell carcinoma, meningioma, chromophobe renal cancer, and cholangiocarcinoma, with affected individuals often developing multiple primary malignancies over their lifetime (Pilarski et al., 2024).
- Tumors associated with BAP1 generally occur at younger ages than their sporadic counterparts, and certain malignancies, particularly uveal melanoma and renal cell carcinoma, tend to demonstrate more aggressive biological behavior (Pilarski et al., 2024).
- Uveal melanoma is the most common malignancy reported in BAP1 and is typically characterized by high risk molecular features associated with increased metastatic potential and reduced survival compared with uveal melanoma in the general population (Pilarski et al., 2024).
- Malignant mesothelioma in BAP1 often presents earlier than sporadic disease and shows a higher proportion of peritoneal involvement; despite its severity, BAP1 associated mesothelioma may demonstrate improved survival and treatment responsiveness compared with non hereditary cases (Pilarski et al., 2024).
- Renal cell carcinoma in BAP1 most commonly exhibits clear cell histology, occurs at a younger median age than sporadic RCC, and is associated with higher tumor grade and worse prognosis, underscoring the importance of early detection (Pilarski et al., 2024).

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- Multiple expert groups have proposed structured surveillance strategies emphasizing dermatologic, ophthalmologic, abdominal, and thoracic evaluation, with a preference for imaging modalities that balance early tumor detection against cumulative radiation exposure (Pilarski et al., 2024).

Evidence Discussion

- The broad tumor spectrum and high penetrance of malignancies in BAP1 support proactive surveillance imaging to enable identification of clinically occult tumors at potentially curable stages (Pilarski et al., 2024).
- Regular ophthalmologic surveillance facilitates early identification of uveal melanoma, which is particularly critical given the aggressive phenotype and elevated metastatic risk associated with BAP1-related tumors (Pilarski et al., 2024).
- Surveillance imaging of the abdomen allows for early detection of renal cell carcinoma, which in BAP1 occurs at younger ages and is associated with poorer outcomes when diagnosed at advanced stages (Pilarski et al., 2024).
- Routine chest CT screening is not universally recommended due to radiation risk and uncertain benefit; instead, clinical evaluation is favored given the lack of consensus on optimal mesothelioma screening modalities (Pilarski et al., 2024).
- Surveillance strategies emphasize minimizing cumulative radiation exposure by prioritizing MRI and ultrasound where feasible, reflecting the need for lifelong monitoring in genetically predisposed individuals (Pilarski et al., 2024).
- While surveillance imaging may identify incidental findings or increase health care utilization, the high morbidity and mortality associated with advanced BAP1-related cancers support an imaging approach tailored to tumor risk, age, and organ system involvement (Pilarski et al., 2024).

Health Equity Considerations

BAP1 is a rare inherited cancer syndrome associated with increased risk of uveal melanoma, cutaneous melanoma, malignant mesothelioma, and renal cell carcinoma, requiring lifelong surveillance imaging across multiple organ systems. Health equity concerns arise from both the rarity of the syndrome and emerging evidence that biologic, social, and structural factors intersect to influence cancer presentation and outcomes in BAP1-associated malignancies. Data from population-level cancer genomics demonstrate that disparities in renal cell carcinoma outcomes between Black and White individuals have historically been attributed to differences in access to high-quality care, rates of surgical intervention, and broader social determinants of health rather than differences in tumor detection or imaging frequency (Paulucci et al., 2016). These findings underscore the importance of equitable access to specialty imaging, genetic evaluation, and multidisciplinary care for individuals with suspected or confirmed BAP1, particularly as cancers in this syndrome may present at younger ages and with aggressive clinical behavior.

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Notably, genomic analyses reveal that BAP1 expression and its relationship to tumor stage and pathologic features vary by race, with Black patients showing higher BAP1 expression and more localized disease despite historically worse overall survival outcomes (Paulucci et al., 2016). This paradox highlights the limitations of relying solely on biologic markers without addressing structural inequities, including delayed diagnosis, barriers to nephrectomy or tumor-directed therapies, and inconsistent follow up imaging. For individuals with BAP1, inequitable access to genetic testing may further delay identification of at risk family members and initiation of guideline concordant surveillance. Equity-focused imaging guidelines should therefore prioritize early genetic confirmation, consistent cross-sectional and organ-specific imaging surveillance, and care coordination across socioeconomic and racial groups to reduce preventable disparities in cancer stage at diagnosis and long term outcomes in this high risk population (Paulucci et al., 2016).

Hereditary Papillary Renal Carcinoma (HPRC)

Criteria

The following imaging studies should be considered medically necessary in individuals with HPRC:

Indication	Medically Necessary Imaging Study
• All individuals with HPRC, beginning at age 30 years	• Abdominal MRI without and with contrast (CPT® 74183) annually

Background and Supporting Information

- HPRC is an autosomal dominant cancer predisposition syndrome caused by activating germline pathogenic variants in the tyrosine kinase domain of the MET proto-oncogene, leading to constitutive MET signaling (PDQ Cancer Genetics Editorial Board, 2024).
- HPRC predisposes affected individuals to bilateral and multifocal papillary renal cell carcinoma (RCC), previously designated as type 1 papillary RCC, with no consistent extrarenal manifestations identified (PDQ Cancer Genetics Editorial Board, 2024).
- Germline MET pathogenic variants demonstrate very high penetrance, approaching 100%, with renal tumors typically developing in adulthood but reported across a wide age range (approximately 19–66 years) (PDQ Cancer Genetics Editorial Board, 2024).
- HPRC-associated tumors have a characteristic papillary morphology consisting of small basophilic cells arranged in single layers on thin papillae and are often low grade, although high grade and metastatic tumors can occur (PDQ Cancer Genetics Editorial Board, 2024).

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- Renal tumors in HPRC are frequently bilateral, multifocal, and numerous, with microscopic papillary adenomas and incipient lesions commonly present throughout the renal parenchyma (PDQ Cancer Genetics Editorial Board, 2024).
- Given the near universal penetrance and lifelong risk of tumor development, expert consensus supports ongoing cross-sectional renal imaging surveillance in individuals with HPRC to support early detection and renal preservation (PDQ Cancer Genetics Editorial Board, 2024).

Evidence Discussion

- Individuals with HPRC develop multiple bilateral renal tumors over time, often asymptomatic at small sizes; routine surveillance imaging enables identification of tumors before they progress to metastatic or symptomatic disease (PDQ Cancer Genetics Editorial Board, 2024).
- Papillary RCCs associated with HPRC are characteristically hypovascular and may demonstrate minimal enhancement, making them difficult to detect by ultrasound alone (PDQ Cancer Genetics Editorial Board, 2024).
- Because imaging surveillance must continue throughout life and many individuals will undergo repeated studies, MRI is generally preferred to limit cumulative radiation exposure while maintaining sensitivity for small renal tumors (PDQ Cancer Genetics Editorial Board, 2024).
- Prospective observational data support radiologic surveillance of HPRC associated renal tumors until the largest lesion approaches approximately 3cm, at which point nephron-sparing surgery can be performed to balance oncologic control with renal function preservation (PDQ Cancer Genetics Editorial Board, 2024).
- Although frequent imaging increases healthcare utilization and may identify incidental findings, the exceptionally high penetrance of renal tumors and effectiveness of early surgical intervention support the benefit of structured imaging surveillance in HPRC (PDQ Cancer Genetics Editorial Board, 2024).
- The natural history of HPRC, characterized by predictable, kidney-limited tumor development with prolonged asymptomatic growth, supports a tailored imaging approach that differs from sporadic RCC management and aligns with specialized surveillance criteria (PDQ Cancer Genetics Editorial Board, 2024).

Health Equity Considerations

HPRC is a rare autosomal dominant cancer predisposition syndrome characterized by bilateral, multifocal papillary renal cell carcinomas driven by germline MET activation. Although HPRC accounts for only a small subset of papillary renal cell carcinoma (PRCC), broader population level data on PRCC highlight important equity related factors that are directly relevant to imaging surveillance and outcomes in hereditary disease. Large registry based analyses demonstrate that Black race is independently associated with increased mortality in PRCC, even after adjustment for age, tumor grade, stage, and size, suggesting that social and structural determinants of health

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contribute meaningfully to observed outcome disparities (Ullah et al., 2023). Delayed diagnosis, barriers to specialty referral, and inconsistent access to high quality imaging may disproportionately affect populations already shown to have worse prognoses, which is particularly consequential in HPRC where early detection of small, asymptomatic renal tumors is central to nephron-sparing management strategies (Ullah et al., 2023).

Equitable access to guideline-concordant imaging surveillance is therefore critical for individuals with HPRC and at-risk family members. Cross-sectional abdominal imaging with contrast enhanced MRI or CT is essential for identifying multifocal and bilateral renal tumors before they exceed size thresholds associated with metastasis and worse survival (Ullah et al., 2023). However, disparities in access to advanced imaging, genetic counseling, and longitudinal follow-up may lead to later detection with larger tumors, a factor shown to independently predict mortality and to be more prevalent among Black patients with PRCC (Ullah et al., 2023). Health equity-focused imaging guidelines for HPRC should prioritize early genetic identification, consistent high-quality renal imaging across the lifespan, and coordinated multidisciplinary care, with particular attention to populations historically shown to experience worse outcomes despite similar disease biology.

DICER1

Criteria

The following imaging studies should be considered medically necessary in individuals with DICER1:

Indication	Medically Necessary Imaging Study
• DICER1 mutation asymptomatic lung surveillance	• Once at age 3-6 months of age and again at 2.5-3 years of age: ◦ CT Chest (contrast as requested) • In addition, chest x-ray at birth and every 6 months until 8 years of age and annually until age 12

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Indication	Medically Necessary Imaging Study
• DICER1 mutation asymptomatic abdominal and pelvic surveillance	• Every 3 months, from birth to the 8th birthday, then every 12 months until 12 years of age: ◦ Abdominal US (CPT® 76700) • After age 12, it is considered medically necessary for females with DICER1 mutation to continue abdominal and pelvic ultrasounds (CPT® 76700 and CPT® 76856 or CPT® 76857) annually until age 40
• DICER1 mutation thyroid surveillance	• Baseline thyroid US (CPT® 76536) by 8 years of age then every 3 years
• Individuals with DICER1 mutation and new CNS symptoms	• MRI Brain without and with contrast (CPT® 70553)

Background and Supporting Information

- DICER1-related tumor predisposition is an autosomal dominant hereditary cancer predisposition syndrome caused by heterozygous germline loss of function pathogenic variants in the DICER1 gene, which encodes an RNase III endoribonuclease essential for microRNA biogenesis and gene regulation (Schultz et al., 2026).
- DICER1 demonstrates reduced, age-dependent penetrance, with many individuals carrying a germline DICER1 pathogenic variant remaining clinically unaffected throughout life, while others develop one or more benign or malignant tumors, often during childhood or early adulthood (Schultz et al., 2026).
- DICER1 is associated with a broad spectrum of neoplasms affecting multiple organ systems, including lung (pleuropulmonary blastoma and lung cysts), thyroid (multinodular goiter and differentiated thyroid carcinoma), kidney (pediatric cystic nephroma, anaplastic sarcoma of the kidney, and Wilms tumor), female reproductive tract (ovarian sex cord stromal tumors), and central nervous system (pituitary blastoma, pineoblastoma, and DICER1-associated CNS sarcoma) (Schultz et al., 2026).
- Distinct tumors in DICER1 have characteristic age distributions, with pleuropulmonary blastoma and lung cysts primarily occurring in infancy and early childhood, pediatric cystic nephroma presenting most often before age four years, and ovarian and thyroid tumors typically arising in adolescence or young adulthood (Schultz et al., 2026).
- Pleuropulmonary blastoma (PPB) exists along a continuum from cystic (type I or regressed type Ir) to aggressive solid sarcomatous forms (types II-III), with early

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cystic lesions representing a precursor state that may progress rapidly, underscoring the importance of early thoracic evaluation (Schultz et al., 2026).
- Thyroid involvement is common in DICER1, with a markedly increased lifetime risk of multinodular goiter and a substantially elevated risk of differentiated thyroid carcinoma, particularly follicular patterned tumors, which are often intrathyroidal and indolent but may be multifocal (Schultz et al., 2026).
- Multidisciplinary expert groups have established structured, age-specific surveillance strategies emphasizing symptom awareness, targeted imaging, and minimization of cumulative radiation exposure (Schultz et al., 2026).

Evidence Discussion

- The wide anatomic distribution, early age of onset, and potential for malignant progression of DICER1-associated tumors provide strong evidence for systematic, imaging-based surveillance to identify lesions at an early, more treatable stage (Schultz et al., 2026).
- Early chest imaging in infancy and young childhood facilitates detection of lung cysts and early-stage pleuropulmonary blastoma, enabling intervention before progression to aggressive solid tumors with significantly worse survival outcomes (Schultz et al., 2026).
- Abdominal ultrasound-based surveillance in childhood supports early identification of pediatric cystic nephroma and related renal tumors, which may otherwise grow rapidly or undergo sarcomatous transformation if not detected and managed promptly (Schultz et al., 2026).
- Periodic thyroid ultrasound allows detection of multinodular goiter and differentiated thyroid carcinoma; however, given the generally indolent biology of many DICER1-associated thyroid cancers, surveillance strategies emphasize judicious imaging to balance early detection against overdiagnosis (Schultz et al., 2026).
- Pelvic ultrasound surveillance in females permits early detection of ovarian sex cord stromal tumors, which are frequently diagnosed at early stage and have favorable outcomes when managed promptly (Schultz et al., 2026).
- Evidence does not support routine screening brain MRI in asymptomatic individuals; instead, symptom directed MRI is recommended to avoid unnecessary sedation and imaging burden while still enabling timely diagnosis of rare but serious CNS malignancies (Schultz et al., 2026).
- Surveillance protocols prioritize ultrasound and MRI over CT whenever feasible, reflecting evidence that individuals with DICER1 require repeated imaging across childhood and young adulthood, making radiation minimization a key consideration (Schultz et al., 2026).
- Although surveillance imaging may lead to incidental findings, increased healthcare utilization, and patient anxiety, available evidence supports that the benefits of early

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tumor detection and improved outcomes outweigh these potential harms in individuals with DICER1 related tumor predisposition (Schultz et al., 2026).

PTEN Hamartoma Tumor Syndrome (PHTS)/Cowden Syndrome (CS)

Criteria

The following imaging studies should be considered medically necessary in individuals with PHTS/CS:

Indication	Medically Necessary Imaging Study
All individuals with PHTS/CS	• Baseline MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170) at age 30, followed by renal US (CPT® 76770) every 1-2 years

Background and Supporting Information

- PTEN hamartoma tumor syndrome (PHTS), which includes Cowden syndrome (CS), is an autosomal dominant cancer predisposition syndrome caused by pathogenic variants in the PTEN tumor suppressor gene. Major manifestations include macrocephaly, mucocutaneous lesions, breast cancer, endometrial cancer, and follicular thyroid cancer. Renal cell carcinoma (RCC) is recognized as a syndrome-associated malignancy and is included as a minor diagnostic feature (NCCN, 2026).
- Renal neoplasms associated with PHTS/CS most commonly demonstrate chromophobe and papillary histology, although other RCC subtypes have been reported (NCCN, 2026).

Evidence Discussion

- Individuals with PHTS/CS have an increased lifetime risk of RCC relative to the general population, supporting the use of dedicated kidney cancer surveillance strategies rather than symptom-driven evaluation alone (NCCN, 2026).
- Surveillance recommendations include baseline abdominal imaging with contrast-enhanced MRI (preferred) or CT beginning at age 30 years, reflecting the documented risk of renal malignancy and the potential for clinically occult disease. (NCCN, 2026).
- Following baseline cross-sectional imaging, renal ultrasound at 1- to 2-year intervals is recommended as an imaging surveillance strategy that balances early detection of RCC with minimization of cumulative radiation exposure in a hereditary cancer population requiring lifelong monitoring (NCCN, 2026).
- CT should be limited when possible for surveillance of hereditary RCC syndromes because of lifetime radiation exposure concerns, supporting MRI as the preferred baseline cross-sectional modality in PHTS/CS (NCCN, 2026).

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- Surveillance imaging may permit identification of renal tumors at an earlier stage, when nephron-sparing approaches can be considered, thereby preserving renal function while maintaining oncologic control. This consideration is particularly important for hereditary cancer syndromes in which lifelong cancer risk exists (NCCN, 2026).

Other Renal Predisposition Syndromes

Criteria

- The list of syndromes and congenital anomalies associated with Wilms Tumor specifically is ever growing. The following genetic variants and syndromes, not otherwise listed in **PEDONC-2** for more specific imaging, may have imaging as shown below.

The following imaging studies should be considered medically necessary in individuals with other renal predisposition syndromes:

Indication	Medically Necessary Imaging Study
• Individuals with any of the following genetic variants or syndromes: ◦ REST, TRIM28, FBXW7, NYNRIN, KDM3B, XPO5, CHECK2, PALB2, CTNNB1, DROSHA, WT1 and 2, WTX, DGCR8, SIC1 and 2, BCORL1, MLLT1, MYCN, DIS3L2 ◦ Bloom Syndrome/BLM mutations ◦ Frasier Syndrome ◦ Trisomy 18 ◦ Perlman Syndrome ◦ Bohring-Opitz Syndrome (ASXL1) ◦ MULIBREY and Nanism Syndrome ◦ Congenital anomalies associated with Wilms Tumor ▪ Horseshoe kidney ▪ Renal ectopia, hypoplasia, or renal/ureteral duplication ▪ Congenital mesoblastic nephroma	• Every 3 months, from birth to the 8th birthday: ◦ Abdominal US (CPT® 76700)

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Infantile Myofibromatosis (PEDONC-2.18)

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Criteria

The following imaging studies should be considered medically necessary in individuals with Infantile Myofibromatosis:

Indication	Medically Necessary Imaging Study
• Assess for the presence of multifocal disease in children under two years of age with infantile myofibromatosis	• WBMRI (CPT® 76498) once within 6 months of diagnosis
• Pre-operative planning for infantile myofibromatosis or • Signs or symptoms suggesting progression of infantile myofibromatosis that may require treatment with surgery or chemotherapy	• Imaging of cutaneous/muscular sites with MRI with and without contrast of symptomatic sites or sites requiring treatment.
• Unresected, known visceral sites of disease in individuals with infantile myofibromatosis	• MRI without and with contrast of unresected visceral involved sites, every 6 months until the age of two years
• Post-operative evaluation and both of the following in individuals with infantile myofibromatosis: ◦ Adequacy of resection is unclear and ◦ Re-excision is being considered	• One-time MRI without and with contrast

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Indication	Medically Necessary Imaging Study
• Surveillance for emergence of visceral disease in individuals with infantile myofibromatosis	• Every 6 months, until the age of two years: ◦ CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) • CT should not duplicate simultaneous MRI imaging of involved sites
• Individuals with infantile myofibromatosis requiring chemotherapy	• See: **PEDONC-8.3**

Background and Supporting Information

- Infantile myofibromatosis (IM) is a rare benign mesenchymal tumor disorder characterized by the development of myofibroblastic tumors involving skin, subcutaneous tissue, muscle, bone, and, less commonly, visceral organs; lesions are non-metastatic but may cause morbidity through local growth and organ compression (NCI, 2020).
- IM occurs predominantly in infancy and early childhood, with more than 90% of cases diagnosed before two years of age, and an estimated incidence of approximately 1 in 150,000 live births, though underdiagnosis is suspected (NCI, 2020).
- IM presents in distinct clinical forms, including solitary lesions (most common), multicentric disease limited to skin and muscle, multicentric disease with limited visceral involvement, and diffuse multicentric disease with extensive visceral involvement, which carries the highest risk for morbidity and mortality (NCI, 2020).
- Solitary and multicentric non-visceral lesions most commonly affect the skin and muscles of the head, neck, and trunk, while visceral lesions may involve the lungs, heart, gastrointestinal tract, or abdominal organs, where mass effect may impair function (NCI, 2020).
- Most cases of IM are sporadic, but rare familial cases have been associated with pathogenic variants in PDGFRB and NOTCH3, supporting a genetic contribution in select patients (NCI, 2020).
- IM lesions confined to the skin, muscle, or bone frequently demonstrate spontaneous stabilization or regression without intervention, supporting conservative management in the absence of organ compromise (NCI, 2020).
- Prognosis is strongly influenced by the presence or absence of visceral involvement; non-visceral IM has an excellent prognosis, whereas untreated visceral disease is

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associated with markedly reduced survival due to organ compression, particularly cardiopulmonary compromise (NCI, 2020).

Evidence Discussion

- Imaging plays a critical role in determining lesion location, size, and extent, particularly to identify occult visceral involvement that may not be clinically apparent in infants and young children (NCI, 2020).
- Infants may present initially with a single lesion and subsequently develop additional lesions within the first two years of life, and their limited ability to express symptoms supports targeted imaging to evaluate for clinically significant internal disease (NCI, 2020).
- Routine serial imaging of cutaneous or muscular lesions is not necessary in asymptomatic infants, as spontaneous regression or stabilization is common and unnecessary imaging may increase burden without improving outcomes (NCI, 2020).
- Imaging is justified when symptoms, lesion burden, or clinical findings raise concern for visceral involvement, as unmanaged internal tumors are associated with substantial morbidity and poor survival (NCI, 2020).
- Surveillance beyond early childhood is generally not warranted, as the vast majority of IM lesions present before age two years and the risk of new lesion development declines significantly thereafter (NCI, 2020).
- Imaging strategies emphasizing symptom-directed and risk-based evaluation optimize early detection of life threatening visceral disease while minimizing unnecessary imaging, sedation, and radiation exposure in a population with high rates of spontaneous lesion regression (NCI, 2020).

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Bloom Syndrome (PEDONC-2.19)

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Criteria

The following imaging studies should be considered medically necessary in individuals with Bloom Syndrome:

Indication	Medically Necessary Imaging Study
Malignancy screening, particularly lymphomas, in individuals with Bloom syndrome	• Every 2 years, starting at age 13: ◦ Whole-Body MRI (CPT® 76498)
Wilms tumor screening in individuals with Bloom syndrome	• See: **Other Renal Cell Cancer Predisposition Syndromes (PEDONC-2.17)**
Gastrointestinal tumor screening in individuals with Bloom syndrome	• There is no strong data to support endoscopic screening
Breast cancer screening in individuals with Bloom syndrome	• There is no strong data to support Breast MRI. See: **Breast MRI Indications (BR-5.1)** for any updates to imaging

Background and Supporting Information

- Bloom syndrome is a rare autosomal recessive chromosomal instability disorder caused by biallelic pathogenic variants in the BLM gene, resulting in defective DNA repair, genomic instability, and markedly increased cancer susceptibility beginning in childhood or early adulthood (Langer et al., 2023).
- Bloom syndrome is characterized by severe pre- and post-natal growth deficiency, microcephaly, sun sensitive facial telangiectatic erythema, immunodeficiency, insulin resistance, and multisystem involvement, with normal or near normal intellectual development in most affected individuals (Langer et al., 2023).
- Individuals with Bloom syndrome have a substantially elevated lifetime risk of malignancy involving a wide range of tissues, including hematologic malignancies, gastrointestinal cancers, breast cancer, skin cancers, and Wilms tumor, often presenting decades earlier than in the general population (Langer et al., 2023).

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- Malignancies in Bloom synrome can arise in virtually any organ system, with particularly increased frequencies of leukemia, lymphoma, colorectal cancer, Wilms tumor, breast cancer, and head and neck tumors, reflecting the underlying defect in genome maintenance (Langer et al., 2023).
- Cancer risk in Bloom syndrome begins in childhood, with Wilms tumor and leukemia presenting in early childhood, followed by increasing rates of solid tumors, including colorectal and breast cancer, during adolescence and young adulthood (Langer et al., 2023).
- Individuals with Bloom syndrome demonstrate hypersensitivity to ionizing radiation and DNA-damaging agents, increasing the risk of treatment-related toxicity and secondary malignancies and influencing diagnostic and surveillance imaging strategies (Langer et al., 2023).
- Expert-based health supervision recommendations emphasize intensive clinical monitoring and targeted imaging for early tumor detection while minimizing radiation exposure, given the exceptionally high cancer risk and radiosensitivity in Bloom syndrome (Langer et al., 2023).

Evidence Discussion

- The markedly increased and early-onset cancer risk in Bloom syndrome supports the use of structured imaging surveillance to facilitate early tumor detection, when treatment may be more effective and less morbid (Langer et al., 2023).
- MRI is the preferred imaging modality in Bloom syndrome, as avoidance of ionizing radiation reduces long term cancer risk and treatment-related complications in individuals with impaired DNA repair mechanisms (Langer et al., 2023).
- Intensified surveillance may lead to false positive findings, incidentalomas, increased healthcare utilization, and anxiety; however, these risks are considered outweighed by the benefit of early malignancy detection in a high risk population (Langer et al., 2023).
- Imaging surveillance strategies in Bloom syndrome are tailored to age-specific cancer risks, focusing on childhood renal tumors and hematologic malignancies early in life and transitioning to surveillance for solid tumors during adolescence and adulthood (Langer et al., 2023).
- Available registry data and expert consensus support targeted, low-radiation imaging surveillance as a reasonable balance between early cancer detection and minimization of iatrogenic risk in individuals with Bloom syndrome, despite the absence of large prospective trials (Langer et al., 2023).

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Pediatric Leukemias (PEDONC-3)

Guideline

Pediatric Leukemia General Considerations (PEDONC-3.1)
Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)
Acute Myeloid Leukemia (AML) (PEDONC-3.3)
References (PEDONC-3)

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Pediatric Leukemia General Considerations (PEDONC-3.1)

ONCP.LE.0003.1.A
v1.0.2027

Criteria

- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary in individuals exhibiting CNS symptoms
  - CT Head without or with contrast (CPT® 70450 or CPT® 70460) is considered medically necessary for urgent concerns where MRI would delay care (i.e., suspected CNS bleeding)
  - Imaging due to CSF tumor burden has not been shown to improve the detection of CNS involvement compared with CSF alone
- See: **Hematopoietic Stem Cell Transplantation (HSCT) (PEDONC-20)** for imaging guidelines related to transplant
- Routine advanced imaging is not considered medically necessary in the evaluation and management of chronic myeloid leukemia in the absence of specific localizing clinical symptoms or clearance for hematopoietic stem cell transplantation.

Background and Supporting Information

- The vast majority of leukemias in children are acute, with acute lymphoblastic leukemia (ALL) accounting for approximately 75–80% of cases and acute myeloid leukemia (AML) representing 15–20%; chronic leukemias such as chronic myelogenous leukemia (CML) are rare in pediatric populations (NCCN, 2025).
- Pediatric leukemias originate in the bone marrow with early hematogenous dissemination; imaging is therefore not routinely required for diagnosis but may be used to evaluate suspected complications such as infection, hemorrhage, leukostasis, or extramedullary disease (NCCN, 2025).
- Prognosis and treatment intensity are determined by age, presenting white blood cell count, cytogenetic and molecular features, and minimal residual disease status, rather than radiographic tumor burden (NCCN, 2025).
- Central nervous system, testicular, and other extramedullary sites may be involved at presentation or relapse, with imaging reserved for symptomatic patients or targeted evaluation of suspected sites of disease (NCCN, 2025).
- Profound immunosuppression, cytopenias, and therapy-related toxicities increase the risk of infection and hemorrhage, supporting selective imaging when clinical findings suggest complications rather than routine surveillance (NCCN, 2025).

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Evidence Discussion

- Because pediatric leukemias are primarily marrow-based and monitored through laboratory and bone marrow assessment, routine advanced imaging does not improve outcomes and is not necessary in asymptomatic patients (NCCN, 2025).
- Evidence supports imaging when there is clinical suspicion for complications such as invasive infection, CNS hemorrhage, leukostasis-related organ dysfunction, or extramedullary relapse, where imaging findings may directly alter management (NCCN, 2025).
- Avoidance of unnecessary imaging reduces radiation exposure and sedation risk in children, while symptom-directed imaging maximizes diagnostic yield in a medically fragile population (NCCN, 2025).

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Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)

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Criteria

- Individuals with B-precursor or T-cell lymphoblastic lymphoma without bone marrow involvement are treated similarly to individuals with leukemia of the same cell type and should be imaged according to this guideline section
- This section does not apply to individuals with mature B-cell histology (primarily Burkitt's in children). Please refer to **Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) (PEDONC-5.3)** for guidelines for these individuals

The following imaging studies should be considered medically necessary in individuals with ALL:

- Chest x-ray should be performed to evaluate for mediastinal mass in suspected cases of ALL or upon initial diagnosis.

Indication	Medically Necessary Imaging Study
Suspected testicular involvement in individuals with ALL	Scrotal Ultrasound CPT® 76870 and/or doppler ultrasound of the scrotum CPT® 93975 or 93976
Mediastinal widening is seen on chest x-ray in individuals with ALL	CT Chest (contrast as requested) is considered medically necessary to immediately evaluate for airway compression and anesthesia safety prior to attempting histologic diagnosis

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Indication	Medically Necessary Imaging Study
Individuals with ALL with known or strongly suspected T-cell histology or other suspected lymphoblastic lymphoma involvement	EITHER of the following: ◦ CT Neck (CPT® 70491), CT Chest (CPT® 71260), and CT Abdomen and Pelvis (CPT® 74177) with contrast OR ◦ PET/CT (CPT® 78816) ◦ Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**
Individuals with ALL exhibiting CNS symptoms	MRI Brain without and with contrast (CPT® 70553)
Urgent concerns where MRI would delay care (i.e., suspected CNS bleeding) in individuals with ALL	CT Head without or with contrast (CPT® 70450 or CPT® 70460)

Additional imaging criteria in lymphoblastic lymphoma/lymphomatous extramedullary disease:

Indication	Medically Necessary Imaging Study
• To assess response to therapy **only** for individuals with ALL with known bulky nodal disease (usually with T-cell histology) at the end of induction (4 to 6 weeks) • Individuals with residual masses every new therapy phase (Consolidation, Interim maintenance, etc., generally every 8 to 12 weeks) until disease resolution is seen	CT (contrast as requested)

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Indication	Medically Necessary Imaging Study
Individuals with ALL when residual mass ≥8mm in diameter is present on recent CT imaging and immediate radiation or chemotherapy plan will be based on results • Residual mass of any size with no PET-avidity is considered a complete response at the extranodal/ lymphomatous site	PET/CT (CPT® 78815)
Further surveillance in individuals with ALL, once CT imaging shows no evidence of disease	Chest x-ray or Abdominal ultrasound (CPT® 76700) **only**, as indicated by site(s) of bulky disease present at diagnosis
Individuals with ALL with persistent residual masses performed as part of an end of therapy evaluation	CT of all involved bulky nodal areas (contrast as requested)

Immunosuppression criteria during ALL therapy:

- Individuals with ALL are severely immunocompromised during the first 4 to 6 weeks of treatment (induction) and any conventional imaging request to evaluate for infectious complications during this time frame is considered medically necessary

Indication	Medically Necessary Imaging Study
For infectious disease concerns for individuals with ALL with: • Absolute neutrophil count (ANC) <500 or • Inconclusive findings on chest x-ray or ultrasound at any ANC during active treatment	CT or MRI (contrast as requested)
Individuals with ALL with neurologic symptoms with a history of treatment with methotrexate	MRI Brain without and with contrast (CPT® 70553)
To rule out bleeding associated with sinus venous thrombosis in individuals with ALL treated with asparaginase	MRA/MRV of the head (CPT® 70544, 70545, or 70546)

Imaging criteria during therapy for relapsed ALL:

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- Frequent CT or MRI imaging is considered medically necessary in individuals with ALL to evaluate known or suspected new sites of invasive fungal or other aggressive infections
- Surveillance imaging of asymptomatic individuals with ALL to detect invasive fungal infection is considered medically necessary **only** when acute clinical decisions will be made based on the imaging

Imaging criteria of known or suspected osteonecrosis in ALL:

- See: **Osteonecrosis In Long Term Cancer Survivors (PEDONC-19.4)** for information on osteonecrosis in ALL individuals who have completed therapy

Indication	Medically Necessary Imaging Study
Symptoms suggesting osteonecrosis in individuals with ALL	MRI without contrast or without and with contrast of the affected joint(s) • CT without contrast is considered medically necessary when MRI is contraindicated or unavailable, or for diagnosis of suspected subchondral fracture
Once at 6 to 9 months after diagnosis for individuals with ALL age ≥11 years of age or older	MRI Bilateral Hips (CPT® 73721 or CPT® 73723 with modifier -50)
Reintroduction of corticosteroids is being considered in individuals with ALL whose symptoms have resolved and are still receiving active treatment	Repeat MRI without contrast of the affected joint(s) every 2 cycles of maintenance (every 6 months)
Preoperative planning for individuals with ALL undergoing core decompression	MRI without contrast of the affected joint(s)

Background and Supporting Information

- ALL is the most common pediatric malignancy and is categorized into B-cell and T-cell subtypes, each with distinct patterns of risk stratification, treatment response, and complication profiles (NCCN, 2025).
- Most children with ALL have diffuse marrow disease without bulky masses; mediastinal involvement is more common in T-cell ALL, while CNS and testicular disease represent classic extramedullary sites (NCCN, 2025).
- Corticosteroid-based therapy is associated with osteonecrosis, particularly in adolescents, with peak incidence approximately one year after diagnosis (Expert Panel on Musculoskeletal Imaging, 2022).

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- Treatment-related hypogammaglobulinemia may occur, necessitating intravenous immunoglobulin replacement and heightened vigilance for infectious complications (NCCN, 2025).

Evidence Discussion

- Because most patients have B-precursor ALL without bulky disease, routine cross-sectional imaging for staging or surveillance is not necessary and does not alter outcomes (NCCN, 2025).
- Patients receiving intravenous immunoglobulin replacement and heightened vigilance or those with severe neutropenia should be managed similarly with respect to infection-directed imaging, supporting targeted studies when clinical signs of infection are present (NCCN, 2025).
- Screening MRI for asymptomatic children less than 11 years of age has not been shown to improve functional outcomes or alter management and is therefore not necessary (Expert Panel on Musculoskeletal Imaging, 2022).
- When osteonecrosis is identified on clinically indicated MRI, modification of corticosteroid exposure, particularly during maintenance phases, may occur, demonstrating a role for imaging once symptoms develop (Expert Panel on Musculoskeletal Imaging, 2022).
- MRI of the brain can allow for discrimination between methotrexate neurotoxicity and posterior reversible encephalopathy syndrome (NCCN, 2025).
- CNS-directed imaging can detect clinically significant complications such as leukemic meningeal involvement or intracranial hemorrhage, which directly impact urgent management decisions; NCCN recommends neuroimaging in the presence of neurologic signs or symptoms to evaluate for CNS disease or bleeding, emphasizing a symptom-driven approach that avoids routine imaging in asymptomatic patients while ensuring timely diagnosis of serious complications (NCCN, 2025).
- Evidence supports symptom-driven imaging strategies that identify clinically meaningful complications while avoiding unnecessary sedation, cost, and radiation exposure in children with ALL (NCCN, 2025; Expert Panel on Musculoskeletal Imaging, 2022).

Health Equity Considerations

ALL is the most common pediatric malignancy in the United States, and despite major therapeutic advances with overall survival now exceeding 90%, substantial disparities in outcomes persist across racial, ethnic, and socioeconomic groups. Large population-based analyses demonstrate that Black and Hispanic children experience significantly lower overall survival and higher mortality risk compared with non-Hispanic White and Asian children, even after adjustment for insurance status, income, and comorbidities (Mishra et al., 2024; Winestone & Aplenc, 2019). Socioeconomic disadvantage is a powerful and independent driver of inequity; meta-analytic data show that children with

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ALL from lower socioeconomic status (SES) households have nearly double the risk of death compared with higher SES peers, with particularly pronounced gaps in the United States (Petridou et al., 2015). More recent registry studies further demonstrate that neighborhood-level deprivation remains associated with excess mortality even among children who survive the first 2 and 5 years after diagnosis, underscoring that equity gaps extend beyond induction therapy into long-term survivorship (Hoppmann et al., 2025).

Disparities in ALL outcomes reflect the intersection of structural, social, and biological factors that have direct implications for imaging and surveillance strategies. Limited access to high-quality comprehensive cancer centers, inconsistent follow-up, barriers to advanced diagnostic imaging, and challenges with adherence during prolonged therapy disproportionately affect children from low SES neighborhoods and marginalized racial and ethnic groups (Winestone & Aplenc, 2019; Burke & Thummel, 2020). At the same time, emerging evidence indicates that genetic ancestry and disease biology contribute to inequities; Latino children are more likely to harbor unfavorable cytogenetic features and to live in economically disadvantaged neighborhoods, compounding risk from both biological and social determinants (Kore et al., 2026). Equitable access to diagnostic and surveillance imaging, care coordination across treatment and survivorship, and integration of social context and ancestry informed risk stratification are needed to reduce preventable disparities in outcomes across diverse pediatric populations.

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Acute Myeloid Leukemia (AML) (PEDONC-3.3)

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Criteria

- Frequent CT or MRI imaging is considered medically necessary to evaluate known sites of invasive fungal infection in individuals with AML
- Surveillance imaging of asymptomatic individuals with AML is considered medically necessary to detect invasive fungal infection **only** when acute clinical decisions will be made based on the imaging
- Advanced imaging may be approved on a case-by-case basis for rare individuals with AML with bulky tumor masses (commonly referred to as chloromas, leukemic sarcomas, or myeloid sarcomas) noted on physical examination or other imaging such as plain film or ultrasound

Background and Supporting Information

- AML represents a biologically heterogeneous group of leukemias with aggressive clinical behavior and a higher likelihood of systemic complications at presentation compared with ALL (NCCN, 2025).
- Myeloid sarcomas and CNS involvement can occur but are uncommon overall; AML typically presents without bulky nodal disease (NCCN, 2025).
- Cytogenetic and molecular abnormalities define AML risk groups and therapeutic approaches, reducing reliance on imaging-based disease assessment (NCCN, 2025).

Evidence Discussion

- The majority of pediatric individuals with AML do not have bulky or anatomically localized disease, and routine advanced imaging has not been shown to improve diagnostic accuracy or outcomes (NCCN, 2025).
- Imaging is appropriate when symptoms suggest leukostasis, extramedullary involvement, CNS disease, infection, or hemorrhage, as these findings may affect urgent management decisions (NCCN, 2025).
- Restricting imaging to clinically indicated scenarios minimizes radiation exposure and procedural risk while preserving the ability to detect life threatening complications in AML (NCCN, 2025).

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Health Equity Considerations

AML is a rare but highly aggressive pediatric malignancy associated with substantial treatment-related morbidity and mortality, and despite advances in risk stratification and supportive care, marked disparities in outcomes persist across racial, ethnic, and socioeconomic groups. Large institutional and population-based analyses demonstrate that Black children with AML are significantly more likely to present with high leukemic burden, metabolic derangements, and laboratory evidence of multiorgan dysfunction at diagnosis, factors that are strongly associated with increased induction-related complications and early mortality (Winestone et al., 2024). Survival inequities extend beyond initial presentation; analyses of cooperative group and registry data show that Black and Hispanic children experience inferior event-free and overall survival compared with non-Hispanic White children, including within cytogenetic subgroups traditionally considered favorable, such as core binding factor AML (Conneely et al., 2021). At a global level, children in lower sociodemographic index regions continue to bear a disproportionate burden of AML-related mortality and disability, reflecting persistent gaps in early diagnosis, access to advanced diagnostics, and availability of definitive therapy despite overall improvements in incidence and survival (Jia et al., 2025).

Disparities in AML outcomes reflect a complex interplay of structural, social, and biological factors with direct implications for diagnostic imaging and disease monitoring. Barriers to timely evaluation, limited access to high volume pediatric oncology centers, and inconsistent follow-up disproportionately affect children from socioeconomically disadvantaged communities and historically marginalized racial and ethnic groups, contributing to later presentation and higher acuity at diagnosis (Winestone et al., 2024). Emerging evidence further indicates that biologic differences contribute to inequity; pharmacogenomic variants influencing cytarabine metabolism and treatment response are more prevalent among Black pediatric patients, and standard intensity induction therapy is associated with inferior outcomes unless treatment is appropriately intensified (Lamba et al., 2024). Equitable access to diagnostic and surveillance imaging, timely identification of treatment-related complications, and integration of biological risk with social context are needed to support earlier intervention and reduce preventable disparities across diverse pediatric populations (Conneely et al., 2021; Jia et al., 2025).

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CNS Tumors (PEDONC-4)

Guideline

CNS Tumors General Considerations (PEDONC-4.1)
CNS Low Grade Gliomas (LGG) (PEDONC-4.2)
CNS High Grade Gliomas (HGG) (PEDONC-4.3)
Medulloblastoma (MDB), Other CNS Embryonal Tumors, and Pineoblastoma (PEDONC-4.4)
Atypical Teratoid/Rhabdoid Tumors (ATRT) (PEDONC-4.5)
Pineocytomas and Pineal Parenchymal Tumors (PEDONC-4.6)
CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT) (PEDONC-4.7)
Ependymal Tumors (Ependymoma) (PEDONC-4.8)
Malignant Tumors of the Spinal Cord (PEDONC-4.9)
Craniopharyngioma and Other Tumors of the Sellar Region (PEDONC-4.10)
Primary CNS Lymphoma (PEDONC-4.11)
Meningiomas (PEDONC-4.12)
Choroid Plexus Tumors (PEDONC-4.13)
References (PEDONC-4)

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CNS Tumors General Considerations (PEDONC-4.1)

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Criteria

- The classification of pediatric central nervous tumors has recently been revised to incorporate molecular biomarkers in addition to histology, immunohistochemical results, and ultrastructure characteristics. The changes in nomenclature are incorporated in these guidelines.
- Central nervous system tumors are the second most common form of childhood cancer, accounting for ~20% of all pediatric malignancies.

Red Flag Symptoms Raising Suspicion for CNS Tumors Include:
Any headache complaint from a child age ≤5 years
Headaches awakening from sleep
Focal findings on neurologic exam
Clumsiness (common description of gait or coordination problems in young children)
Headaches associated with morning nausea/vomiting
New onset of seizure activity with focal features
Papilledema on physical exam
Loss of developmental milestones (infants and young children)

MRI Considerations

- MRI is the preferred imaging modality for all pediatric CNS tumors
  - MRI Brain without and with contrast (CPT® 70553) is the primary imaging study for pediatric brain tumors
  - MRI Brain without contrast (CPT® 70551) if requested for initial evaluation of suspected CNS tumor for children able to undergo MRI without sedation

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- Initial MRI should be performed without and with contrast in order to avoid a second anesthesia exposure in younger children requiring sedation for MRI
- MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be substituted where MRI Spine without and with contrast is considered medically necessary, if being performed immediately following a contrast-enhanced MRI Brain
- Functional MRI (fMRI) (CPT® 70555 or CPT® 70554) is considered medically necessary to depict spatial relationships between eloquent cortex and neoplasms for preoperative planning and to promote safe resections (following baseline MRI Brain).
- Refer to **Neuronavigation (HD-28.2)** for additional guidance on perioperative imaging.
- MRI Orbits without and with contrast (CPT® 70543) is considered medically necessary in individuals who present with papilledema, altered vision, strabismus, nystagmus, anisocoria, proptosis, ocular cranial nerve palsies, coloboma, or leukocoria.

CT Considerations

- CT is considered medically necessary for evaluation of ventriculomegaly or other operative considerations, or for children who cannot undergo MRI safely
  - CT is considered medically necessary for evaluation of headaches related to head trauma or evaluation of skull or facial bone abnormalities
  - Post-contrast CT is generally not considered medically necessary
- CT is not a recommended study for evaluation of pediatric headache when brain tumor is clinically suspected because of its limited diagnostic accuracy in this area. MRI should be used as first line imaging in these cases
- CT should not be used in place of MRI to avoid sedation in young children when red flag symptoms for CNS tumors are present

MRA/CTA and Perfusion Studies

- MRA or CTA is considered medically necessary **only** for preoperative planning or to clarify inconclusive findings on MRI or CT
- CT and MRI Perfusion
  - See: **CT or MRI Perfusion (HD-24.5)** in the Head Imaging guidelines

MR Spectroscopy (MRS, CPT® 76390)

- MRS is **only** considered medically necessary for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature
  - See diagnosis-specific guidelines for MRS indications

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- MRS is considered not considered medically necessary for all other histologies and indications not listed in a diagnosis-specific guideline section
- MR spectroscopy is not considered medically necessary for routine surveillance

PET Brain Imaging (CPT® 78608 and CPT® 78609)

- PET Brain Metabolic imaging (CPT® 78608) is **only** considered medically necessary for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature
  - See diagnosis-specific guidelines for PET indications
- PET Brain Metabolic is not considered medically necessary for routine surveillance
- PET Brain Metabolic imaging is considered not considered medically necessary for all other histologies and indications not listed in a diagnosis-specific guideline section
- PET Brain Perfusion imaging (CPT® 78609) is not considered medically necessary in the evaluation or management of primary CNS tumors
- Fusion PET/CT studies (CPT® 78814, CPT® 78815, or CPT® 78816) are not considered medically necessary in the evaluation or management of primary CNS tumors

Timing and Frequency of Imaging

- Definitive imaging should be completed prior to considering biopsy given the high degree of morbidity associated with operating on the CNS
  - Occasionally biopsy is not necessary because the imaging findings provide a definitive diagnosis
    - Examples include diffuse intrinsic pontine glioma and optic pathway gliomas in an individual with known neurofibromatosis
- Perioperative imaging frequency
  - Children may undergo very frequent imaging in the immediate perioperative period around resection or debulking of a CNS tumor due to the small anatomic spaces involved
    - Requests for imaging during this time period to specifically evaluate postoperative course or ventriculoperitoneal shunt functioning are considered medically necessary
  - MRI Brain without and with contrast (CPT® 70553) is considered medically necessary one time in the immediate preoperative period (even if another study has already been completed) to gain additional information which can be important in optimizing individual outcomes, such as:
    - Completion of additional specialized MRI sequences such as diffusion-tensor imaging
    - Perfusion imaging (CPT® 70553, 70551, OR 70552)
    - Tractography

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    - Other sequences not reported under a separate CPT® code but not part of a routine MRI Brain series
  - Repeat MRI Brain that is being requested solely for loading into operative navigation software should not be requested as a diagnostic code but is considered medically necessary under a treatment planning code (CPT® 76498).
  - **Clinical note**: for all pediatric CNS tumors, cerebrospinal fluid pathology positive for malignancy is considered leptomeningeal/spinal disease.

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CNS Low Grade Gliomas (LGG) (PEDONC-4.2)

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Criteria

- MR Spectroscopy and PET Brain Metabolic are not considered medically necessary for routine surveillance of CNS LGG.
- MRI is generally superior to CT for staging and restaging CNS malignancies, but CT is considered medically necessary in accordance with these guidelines where MRI is contraindicated.
- CNS LGG includes the following tumors:
  - Pediatric-type diffuse low-grade gliomas
    - Diffuse astrocytoma, MYB- or MYBL1-altered
    - Angiocentric glioma
    - Polymorphus low-grade neuroepithelial tumor of the young
    - Diffuse low-grade glioma, MAPK pathway-altered
  - Circumscribed astrocytic gliomas
    - Pilocytic astrocytoma
    - High-grade astrocystoma with piloid features
    - Pleomorphic xanthoastrocytoma
    - Subependymal giant cell astrocystoma (SEGA)
    - Choroid glioma
    - Astroblastoma, MN
  - Glioneuronal and neuronal tumors
    - Ganglioglioneuroma
    - Desmoplastic infantile ganglioglioneuroma/desmoplastic infantile astrocystoma
    - Dysembryoplastic neuroepithelial tumor
    - Diffuse glioneuronal tumor with oligodendroglioma-like features and nuclear clusters
    - Papillary glioneuronal tumor
    - Rosette-forming glioneuronal tumor
    - Myxoid glioneuronal tumor
    - Diffuse leptomeningeal glioneuronal tumor
    - Gangliocytoma Multinodular and vacuolating neuronal tumor
    - Dysplastic cerebellar gangliocytoma (Lhermitte-Duclos disease)
    - Central neurocytoma

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- Extraventricular neurocytoma
- Cerebellar liponeurocytoma

◦ Any other glial tumor with a WHO grade I or II classification

Indication	Medically Necessary Imaging Study
Initial staging of all LGG	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • MRI Orbits without and with contrast (CPT® 70543) in addition to the above studies for individuals presenting with visual signs or symptoms as listed in **PEDONC-4.1**
In addition to the above imaging, for preoperative planning for individuals with LGG	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2).**
• At any time, for ANY of the following in individuals with LGG: ◦ For rapid assessment in the acute setting ◦ Evaluation of acute intracranial hemorrhage ◦ Evaluation of ventriculomegaly ◦ Evaluation of shunt-related issues	• CT Head without contrast (CPT® 70450)
• ANY of the following for individuals with LGG: ◦ Determining the need for biopsy when transformation to high grade glioma is suspected based on clinical symptoms or recent MRI findings ◦ Evaluation of a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed	• PET Brain Metabolic imaging (CPT® 78608)

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Indication	Medically Necessary Imaging Study
• ANY of the following for individuals with LGG: ◦ Distinguish low grade from high grade gliomas ◦ Evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed ◦ Distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy	• MR Spectroscopy (MRS, CPT® 76390)
Baseline imaging after resection for individuals with LGG, to assess degree of resection	• MRI Brain without and with contrast (CPT® 70553) • MRI without and with contrast at level of resected spinal site • If orbital resection, MRI Orbits without and with contrast (CPT® 70543)
Treatment response at the completion of radiotherapy for individuals with LGG	• MRI Brain without and with contrast (CPT® 70553) • MRI without and with contrast at level of irradiated spinal site • If prior orbital involvement, MRI Orbits without and with contrast (CPT® 70543)
Treatment response on chemotherapy for individuals with LGG	• MRI Brain without and with contrast (CPT® 70553) approved every 2 cycles during active treatment and at the end of planned chemotherapy • If prior orbital involvement, MRI Orbits without and with contrast (CPT® 70543)
Additional treatment response imaging during induction chemotherapy for individuals with LGG with measurable spinal cord disease on MRI	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 2 cycles

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Indication	Medically Necessary Imaging Study
Surveillance, including individuals with LGG with unresected disease on observation only	• For individuals with intracranial primary: ◦ MRI Brain without and with contrast (CPT® 70553) every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter. ◦ If prior orbital involvement, MRI Orbits without and with contrast (CPT® 70543) ◦ MRI Spine is not considered medically necessary during surveillance in individuals without prior history of spinal involvement except to evaluate symptoms suspicious for spinal cord recurrence • For individuals with a history of spine primary tumor or metastatic spinal involvement: ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter • For individuals with NF1 **ANY** of the following: ◦ MRI Brain without and with contrast (CPT® 70553 every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter ◦ MRI Orbits without and with contrast (CPT® 70543) every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter
Suspected intracranial or intraspinal recurrence for individuals with LGG	• All imaging supported in initial staging criteria

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Background and Supporting Information

- CNS LGGs are World Health Organization (WHO) grade I–II primary brain tumors and account for approximately 40%–60% of pediatric CNS tumors, making them the most common pediatric brain neoplasms (NCCN, 2025).
- These tumors may arise anywhere in the CNS, including the cerebral hemispheres, optic pathways, brainstem, cerebellum, and spinal cord, with clinical behavior influenced by location and resectability (PDQ® Pediatric Treatment Editorial Board, 2025).
- Prognosis is generally favorable, with long term survival exceeding 90% in many subgroups, particularly when gross total resection is achievable (NCCN, 2025).
- Optic pathway gliomas associated with NF1 may be diagnosed radiographically without biopsy due to characteristic imaging features and predictable clinical behavior (PDQ® Pediatric Treatment Editorial Board, 2025).

Evidence Discussion

- Imaging-based diagnosis and surveillance strategies balance early detection of progression with avoidance of unnecessary anesthesia and radiation exposure, particularly in tumors with indolent behavior (NCCN, 2025).
- Evidence supports observation with serial MRI in asymptomatic or completely resected tumors, as early imaging changes do not consistently correlate with clinically meaningful progression (PDQ® Pediatric Treatment Editorial Board, 2025).
- Restricting advanced imaging to situations of clinical concern reduces potential harms without compromising oncologic outcomes (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

Pediatric LGGs are the most common childhood central nervous system tumors and are associated with excellent overall survival; however, they carry a substantial and often lifelong burden of disease- and treatment-related morbidity. Despite favorable survival, profound disparities exist in access to timely diagnosis, comprehensive neurosurgical care, molecular diagnostics, and long-term management across socioeconomic and geographic contexts. Global and population-based analyses demonstrate wide variability in incidence, diagnostic delay, and outcomes for pediatric LGGs, with children in low and middle income settings disproportionately affected by underdiagnosis, delayed presentation, and limited access to specialized care (Moreira et al., 2023). Even in high income countries, LGGs frequently present insidiously with nonspecific symptoms, leading to diagnostic delays that exacerbate neurologic morbidity and functional impairment, particularly among children facing barriers to specialty referral and advanced imaging (Moreira et al., 2023).

Disparities in LGG outcomes reflect an intersection of structural resource limitations and chronic disease burden with direct implications for imaging access and surveillance.

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Children with LGGs experience high and persistent healthcare utilization over multiple years, including repeated neuroimaging, specialty consultations, emergency care, and hospitalizations, underscoring the importance of consistent access to diagnostic and follow up imaging to monitor disease progression and treatment-related complications (Zelt et al., 2024). Socioeconomic disadvantage and insurance status influence access to these services and to multidisciplinary care, including neurosurgery, neuro-oncology, endocrinology, and rehabilitation, which are essential for optimizing long-term outcomes in a condition that often becomes chronic (Zelt et al., 2024). Equitable access to timely diagnostic imaging, standardized surveillance strategies across the disease continuum, and coordination with specialized centers are needed to reduce preventable neurologic morbidity and long-term functional disparities among diverse pediatric populations (Moreira et al., 2023; Zelt et al., 2024).

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CNS High Grade Gliomas (HGG) (PEDONC-4.3)

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Criteria

- Individuals with HGG who undergo complete resection should be imaged according to surveillance guidelines after post-resection imaging.
- CNS HGG includes the following tumors:
  - Diffuse midline glioma, H3 K27-altered
  - Diffuse hemispheric glioma, H3 G34-mutant
  - Diffuse pediatric-type high-grade glioma, H3-wildtype and IDH-wildtype
  - Infant-type hemispheric glioma
  - Any other glial tumor with a WHO grade of III or IV classification

Indication	Medically Necessary Imaging Study
Initial staging of all HGG	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning for individuals with HGG	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2).**
• At any time, for ANY of the following for individuals with HGG: ◦ For rapid assessment in the acute setting ◦ Evaluation of acute intracranial hemorrhage ◦ Evaluation of ventriculomegaly ◦ Evaluation of shunt-related issues	• CT Head without contrast (CPT® 70450)

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Indication	Medically Necessary Imaging Study
• ANY of the following for individuals with HGG: ◦ Distinguishing radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy ◦ Evaluating inconclusive MRI findings when the PET findings will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance ◦ Evaluation of a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed	• PET Brain Metabolic Imaging (CPT® 78608)
• ANY of the following for individuals with HGG: ◦ To distinguish low grade from high grade gliomas ◦ To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed ◦ To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy	• MR Spectroscopy (MRS, CPT® 76390)
• To depict spatial relationships between eloquent cortex and tumor prior to resection for individuals with HGG	• Functional MRI (fMRI) (CPT® 70544 or CPT® 70555)

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Indication	Medically Necessary Imaging Study
Baseline imaging following resection, to assess degree of resection for individuals with HGG	• MRI Brain without and with contrast (CPT® 70553) AND any of the following • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Treatment response at the completion of radiotherapy for individuals with HGG	• MRI Brain without and with contrast (CPT® 70553) AND any of the following: • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Treatment response on chemotherapy for individuals with HGG	• MRI Brain without and with contrast (CPT® 70553) every 2 cycles during active treatment and at the end of planned chemotherapy AND • For those with known spinal involvement, ANY of the following: ◦ MRI Spine without and with contrast of any and all levels requested every 2 cycles (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • For those with no known spinal involvement, ANY of the following: ◦ MRI Spine without and with contrast of any and all levels requested at end of therapy (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Signs or symptoms of recurrence or progression in individuals with HGG	• MRI Brain without and with contrast (CPT® 70553) AND any of the following • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Surveillance for individuals with HGG	• For individuals with intracranial primary: ◦ MRI Brain without and with contrast (CPT® 70553) every 2 months for 1 year, then every 3 months thereafter ◦ MRI Spine is not considered medically necessary during surveillance in individuals without prior history of spinal involvement except to evaluate symptoms suspicious for spinal cord recurrence • For individuals with a history of spine primary tumor or metastatic spinal involvement: ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 2 months for 1 year, then every 3 months thereafter • For both brain and spine disease, imaging above may be complemented by MR perfusion and/or MR spectroscopy, and these studies are considered medically necessary if requested.

Background and Supporting Information

- Pediatric CNS HGGs are WHO grade III–IV tumors and comprise approximately 10%–20% of pediatric CNS malignancies (NCCN, 2025).
- These tumors are biologically distinct from adult gliomas, frequently harboring pediatric-specific molecular alterations such as H3 K27 altered or H3 G34 mutant profiles (NCCN, 2025).
- Prognosis remains poor, with 5-year overall survival typically less than 20%, despite aggressive multimodality therapy (PDQ® Pediatric Treatment Editorial Board, 2025).
- Tumors may arise throughout the brain and less commonly in the spinal cord, with location influencing surgical and imaging approaches (PDQ® Pediatric Treatment Editorial Board, 2025).

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Evidence Discussion

- Baseline and post-treatment MRI of the brain (and spine when clinically indicated) is supported by evidence demonstrating its importance in assessing tumor burden, treatment response, and progression (NCCN, 2025).
- Routine surveillance imaging allows early identification of recurrence, which may inform eligibility for clinical trials or salvage therapy, despite limited impact on overall survival (PDQ® Pediatric Treatment Editorial Board, 2025).
- Limiting imaging frequency to periods of highest recurrence risk reduces cumulative anesthesia exposure without compromising clinical decision making (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

HGGs in children and adolescents are rare but devastating central nervous system malignancies with poor overall prognosis, and substantial disparities in access to care and treatment persist across racial, ethnic, and socioeconomic groups. National database analyses in the United States demonstrate significant racial differences in insurance status, household income, educational attainment, and access to surgical intervention for pediatric malignant gliomas, with Black children significantly less likely to undergo surgical resection compared with White children (Lu & Niazi, 2022). These disparities are not fully explained by tumor location alone and reflect broader structural inequities that may influence diagnostic evaluation, referral patterns, and treatment planning. In low and middle income settings, emerging data suggest rising incidence of HGGs among younger populations accompanied by limited access to comprehensive molecular profiling and advanced therapies, with poor survival outcomes underscoring global inequities in neuro-oncologic care delivery (Rehman et al., 2026).

Disparities in HGG outcomes reflect the intersection of aggressive tumor biology and structural barriers with direct implications for imaging and disease management. Limited access to high quality diagnostic imaging, advanced neurosurgical services, and molecular characterization can delay accurate diagnosis, limit eligibility for maximal safe resection, and constrain tailoring of adjuvant therapy, disproportionately affecting socioeconomically disadvantaged and historically marginalized populations (Lu & Niazi, 2022). In resource constrained settings, incomplete availability of molecular testing further compounds inequity by limiting prognostication and treatment stratification, despite evidence that molecular features such as IDH mutation status and MGMT promoter methylation have important implications for management and outcomes (Rehman et al., 2026). Standardized access to timely diagnostic and follow-up imaging, equitable referral to specialized neuro-oncology centers, and integration of imaging with molecular and clinical risk assessment are needed to reduce preventable disparities in care and outcomes across diverse pediatric populations (Lu & Niazi, 2022; Rehman et al., 2026).

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Medulloblastoma (MDB), Other CNS Embryonal Tumors, and Pineoblastoma (PEDONC-4.4)

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Criteria

- Includes the following tumors:
  - Medulloblastoma
    - Molecularly-defined Medulloblastoma
      - WNT-activated Medulloblastoma
      - SHH-activated and TP53-wildtype Medulloblastoma
      - SHH-activated and TP53-mutant Medulloblastoma
      - Non-WNT/Non-SHH
    - Medulloblastoma, histologically defined
  - Other CNS Embryonal Tumors (previously supratentorial primitive neuro-ectodermal tumors)
    - CNS embryonal tumor
    - Cribriform neuroepithelial tumor
    - Embryonal tumor with multilayered rosettes
    - CNS neuroblastoma
    - FOXR2-activated CNS tumor with BCOR internal tandem duplication
  - Pineoblastoma
- Risk assessment is important in determining optimal treatment. High-risk features include the following:
  - Spinal metastasis (including cytology positive only)
  - Multifocal intracranial tumors
  - Anaplastic histology
  - All other CNS embryonal tumors and pineoblastomas
  - >1.5cm^2 residual tumor area on postoperative MRI and age <3 years
- Individuals without any high-risk features are considered "average risk"
- MR Spectroscopy and PET Brain Metabolic are not considered medically necessary for routine surveillance for individuals with MDB, other CNS embryonal tumors, and pineoblastoma.

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Indication	Medically Necessary Imaging Study
Initial staging for all individuals with MDB, other CNS embryonal tumors, and pineoblastoma, preoperatively	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• Functional MRI (fMRI) (CPT®) 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**
• At any time, for ANY of the following for individuals with MDB, other CNS embryonal tumors, and pineoblastoma: ◦ For rapid assessment in the acute setting ◦ Evaluation of acute intracranial hemorrhage ◦ Evaluation of ventriculomegaly ◦ Evaluation of shunt-related issues	• CT Head without contrast (CPT® 70450)
• ANY of the following for individuals with MDB, other CNS embryonal tumors, and pineoblastoma: ◦ To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy ◦ To evaluate inconclusive MRI findings when the PET findings will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance ◦ To evaluate a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed	• PET Brain Metabolic Imaging (CPT® 78608)

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Indication	Medically Necessary Imaging Study
• ANY of the following for individuals with MDB, other CNS embryonal tumors, and pineoblastoma: ◦ To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed	• MR Spectroscopy (CPT® 76390)
Postoperative (preferably within 48 hours of surgery) to quantify residual tumor volume for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic (CPT® 72157, Lumbar-CPT® 72158) if spinal disease was resected
Within 28 days post-op, if spinal imaging was not performed preoperatively for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Treatment response for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• At the start of adjuvant chemotherapy and every 2 cycles until therapy is completed: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic CPT® 72157, Lumbar-CPT® 72158)
Children age <3 years with MDB, other CNS embryonal tumors, and pineoblastoma treated with multiple cycles of high dose chemotherapy with autologous stem cell rescue in lieu of radiotherapy	• Disease evaluations (imaging per treatment response guidelines) prior to each cycle (every 4 to 6 weeks) if needed for response determination.

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Indication	Medically Necessary Imaging Study
End of treatment evaluation for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine with contrast (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) or MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Signs or symptoms of recurrence or progression in individuals with MDB, other CNS embryonal tumors, and pineoblastoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Surveillance for individuals with MDB, other CNS embryonal tumors, and pineoblastoma	For low- or average-risk individuals: • Every 3 months for 2 years, then every 6 months for 3 years: ◦ MRI Brain without and with contrast (CPT® 70553) • Every 6 months for 2 years: ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) For high- or very high-risk individuals: • Every 3 months for 2 years, then every 6 months for 3 years: ◦ MRI Brain without and with contrast (CPT® 70553) • Every 3 months for 2 years, then every year for 3 years: ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • For additional imaging guidelines for individuals in long-term follow-up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)**

Background and Supporting Information

- Medulloblastoma and other CNS embryonal tumors collectively account for approximately 15%–25% of pediatric CNS tumors and are characterized by a high propensity for cerebrospinal fluid dissemination (PDQ® Pediatric Treatment Editorial Board, 2025).
- Medulloblastomas are molecularly classified into WNT-activated, SHH-activated (TP53 wildtype or mutant), and non-WNT/non-SHH subgroups, which guide risk stratification and therapy (NCCN, 2025).
- Pineoblastomas share treatment paradigms with embryonal tumors due to similar biological behavior (NCI, 2025).

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- Risk stratification incorporates age, metastatic status, extent of resection, and molecular features (NCCN, 2025).

Evidence Discussion

- Whole neuroaxis MRI is supported by evidence demonstrating frequent leptomeningeal spread at diagnosis and recurrence, influencing staging and treatment planning (PDQ® Pediatric Treatment Editorial Board, 2025).
- Surveillance imaging detects asymptomatic recurrence but has limited impact on long term survival, supporting guideline-directed imaging intervals rather than intensive scanning (NCCN, 2025; Shepherd, 2026).
- Avoidance of unnecessary imaging reduces sedation-related risks and healthcare burden in long term survivors (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

MDB, other central nervous system embryonal tumors, and pineoblastoma are rare, biologically heterogeneous pediatric malignancies that require timely diagnosis, advanced imaging, and risk-adapted multimodal therapy to optimize outcomes. Despite substantial advances in molecular classification and survival for some subgroups, significant disparities persist across racial, ethnic, socioeconomic, and geographic contexts. Population-based and multicenter studies demonstrate that children from socioeconomically disadvantaged backgrounds and those treated outside high volume or specialized centers experience delays in diagnosis, reduced access to molecular subgrouping, and inferior survival outcomes (Dressler et al., 2018; Kopecký et al., 2017). International analyses further highlight pronounced survival gaps between high income countries and low and middle income settings, driven by limited access to neuroimaging, neurosurgical expertise, craniospinal irradiation, and comprehensive supportive care (Greppin et al., 2022; Díaz Coronado et al., 2025).

Disparities in outcomes for embryonal CNS tumors reflect the interaction of aggressive disease biology and structural barriers with direct implications for imaging and disease monitoring. Accurate risk stratification for MDB and related tumors increasingly depends on advanced imaging and molecular diagnostics, yet access to these resources remains uneven, particularly for historically marginalized populations and patients treated in under-resourced health systems (Hansford et al., 2022; Peterson et al., 2025). Limited availability of serial surveillance imaging and specialized follow-up further compounds inequity, as survivors of these tumors face high risks of relapse and long-term neurologic and neurocognitive morbidity (Ronsley et al., 2024; Dressler et al., 2018). Standardized access to timely diagnostic and surveillance imaging, referral to specialized pediatric neuro-oncology centers, and integration of imaging with molecular and clinical risk assessment are needed to reduce preventable disparities in outcomes across diverse pediatric populations (Greppin et al., 2022; Peterson et al., 2025).

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Atypical Teratoid/Rhabdoid Tumors (ATRT) (PEDONC-4.5)

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Criteria

- PET Brain Metabolic does not have a defined role in the evaluation of ATRT at this time and is, therefore, not considered medically necessary.
- MR Spectroscopy is not considered medically necessary for routine surveillance of ATRT.
- Rhabdoid malignancies occurring outside the CNS should be imaged according to **Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites (PEDONC-7.6)**.
- MRI performed at the end of consolidation therapy should serve as the diagnostic MRI prior to radiotherapy in individuals with ATRT.

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with ATRT, preoperatively	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • Renal US (CPT® 76770) ◦ If renal US is abnormal, refer to: **Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites (PEDONC-7.6)**
In addition to the above imaging, for preoperative planning in individuals with ATRT	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**

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Indication	Medically Necessary Imaging Study
• At any time, for ANY of the following in individuals with ATRT: ◦ For rapid assessment in the acute setting ◦ Evaluation of acute intracranial hemorrhage ◦ Evaluation of ventriculomegaly ◦ Evaluation of shunt-related issues	• CT Head without contrast (CPT® 70450)
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed in individuals with ATRT	• MR Spectroscopy (CPT® 76390)
Postoperative (preferably within 48 hours of surgery) to quantify residual tumor volume in individuals with ATRT	• MRI Brain without and with contrast (CPT® 70553)
Within 28 days post-op, if spinal imaging was not performed preoperatively in individuals with ATRT	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Treatment response to induction chemotherapy in individuals with ATRT	• After every 2 cycles: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Individuals treated with consolidation chemotherapy and autologous stem cell rescue in individuals with ATRT	• Disease evaluation is considered medically necessary following the end of the planned stem cell rescues but may occur prior to each cycle (every 4 to 6 weeks) if needed for response determination

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Indication	Medically Necessary Imaging Study
End of treatment evaluation in individuals with ATRT	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Signs or symptoms of recurrence or progression in individuals with ATRT	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Surveillance in individuals with ATRT	• Every 3 months for 2 years, then every 6 months for 3 years, then annually for 10 years: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)**

Background and Supporting Information:

- ATRT is a rare but highly aggressive embryonal tumor occurring primarily in infants and young children, often associated with loss of SMARCB1 (INI1) expression (PDQ® Pediatric Treatment Editorial Board, 2025).
- These tumors commonly demonstrate early leptomeningeal dissemination and may coexist with extracranial rhabdoid tumors, particularly in the kidney (NCCN, 2025).
- Overall prognosis is poor, with survival rates generally below 30% despite intensive multimodal therapy (PDQ® Pediatric Treatment Editorial Board, 2025).

Evidence Discussion

- MRI of the brain and spine is essential for staging and response assessment due to the high incidence of multifocal and metastatic disease (NCCN, 2025).

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- Imaging following completion of systemic therapy guides radiation planning but should be limited thereafter to clinically meaningful intervals to avoid cumulative harm (Expert Panel on Neurological Imaging, 2019).

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Pineocytomas and Pineal Parenchymal Tumors (PEDONC-4.6)

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Criteria

- PET Brain Metabolic imaging and MR Spectroscopy do not have a defined role in the evaluation of pineocytoma.
- Individuals with a complete resection for pineocytomas and pineal parenchymal tumors should be imaged according to surveillance guidelines
- After end of radiotherapy imaging, individuals with pineocytomas and pineal parenchymal tumors should be imaged according to surveillance guidelines

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with pineocytomas and pineal parenchymal tumors	• MRI Brain without and with contrast (CPT® 70553)
In addition to the above imaging, for preoperative planning in individuals with pineocytomas and pineal parenchymal tumors	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**
• Additional initial staging imaging for individuals with pineocytomas and pineal parenchymal tumors with: ◦ Multicentric tumors ◦ Atypical histology including pineoblastoma-like elements (grade 2 or 3 pineal parenchymal tumor which have not been considered a pineoblastoma) ◦ Clinical signs or symptoms suggesting spinal cord involvement	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Baseline imaging following resection in individuals with pineocytomas and pineal parenchymal tumors	• MRI Brain without and with contrast (CPT® 70553)
End of radiotherapy in individuals with pineocytomas and pineal parenchymal tumors	• MRI Brain without and with contrast (CPT® 70553)
Additional imaging at end of radiotherapy for individuals individuals with pineocytomas and pineal parenchymal tumors with measurable spinal cord disease on MRI	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Surveillance in individuals with pineocytomas and pineal parenchymal tumors	• MRI Brain without and with contrast (CPT® 70553) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually thereafter
Additional surveillance imaging for individuals with pineocytomas and pineal parenchymal tumors with cord involvement at diagnosis	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) after completion of therapy every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually thereafter
Signs or symptoms of recurrence or progression in individuals with pineocytomas and pineal parenchymal tumors	• MRI Brain without and with contrast (CPT® 70553)
Suspected spinal cord recurrence or progression in individuals with pineocytomas and pineal parenchymal tumors	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

Background and Supporting Information

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- Pineocytomas and related pineal parenchymal tumors are generally low grade neoplasms with favorable outcomes following surgical resection (PDQ® Pediatric Treatment Editorial Board, 2025).
- These tumors may present with hydrocephalus due to obstruction of the aqueduct of Sylvius (NCCN, 2025).

Evidence Discussion

- Postoperative MRI establishes a baseline for surveillance, while long-term imaging is reserved for incomplete resection or adjuvant therapy scenarios (NCCN, 2025).
- Limiting advanced imaging in asymptomatic individuals avoids unnecessary interventions without impacting cure rates (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

Pineocytomas and other pineal parenchymal tumors are rare pediatric central nervous system neoplasms with heterogeneous clinical behavior and outcomes that vary substantially by age at diagnosis, histologic subtype, and disease stage. Population-based analyses demonstrate that younger children, particularly those under 5 years of age, and patients with more aggressive subtypes, such as pineoblastoma, experience significantly worse survival outcomes compared with older children and those with less aggressive histologies (Shen et al., 2025). Although racial differences in survival were not statistically significant in large registry data, notable variation exists in tumor stage at diagnosis and use of radiation therapy, highlighting potential inequities in early detection, referral patterns, and access to specialized oncologic care for children with pineal parenchymal tumors (Shen et al., 2025).

Disparities in outcomes for pineocytomas and pineal parenchymal tumors reflect the interaction of rare tumor biology with structural differences in access to diagnostic imaging and definitive therapy. Advanced neuroimaging is critical for accurate staging and treatment planning in pineal region tumors, yet delays in diagnosis can result in more advanced disease at presentation, which is independently associated with inferior survival (Shen et al., 2025). Radiation therapy has been shown to significantly improve survival for pediatric patients with malignant pineal region tumors, underscoring the importance of equitable access to radiation oncology services and longitudinal imaging surveillance to guide therapy and monitor response (Shen et al., 2025). Timely diagnostic imaging, standardized staging and follow-up protocols, and referral to specialized pediatric neuro-oncology centers are needed to reduce preventable disparities in outcomes for children with pineocytomas and other pineal parenchymal tumors.

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CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT) (PEDONC-4.7)

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Criteria

- PET Metabolic Brain imaging does not have a defined role in the evaluation of CNS Germinomas and NGGCT and is, therefore, considered not medically necessary.
- Includes the following tumors:
  - CNS Germinoma
  - Non-Germinomatous Germ Cell Tumors (NGGCT)
    - Embryonal carcinoma
    - Yolk sac tumor
    - Choriocarcinoma
    - Immature Teratoma
    - Mature Teratoma
    - Mixed germ cell tumor

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with germinomas and NGGCT	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning in individuals with germinomas and NGGCT	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**

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Indication	Medically Necessary Imaging Study
• At any time, for ANY of the following in individuals with germinomas and NGGCT: ◦ For rapid assessment in the acute setting ◦ Evaluation of acute intracranial hemorrhage ◦ Evaluation of ventriculomegaly ◦ Evaluation of shunt-related issues	• CT Head without contrast (CPT® 70450)
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed in individuals with germinomas and NGGCT	• MR Spectroscopy (CPT® 76390)
Treatment response to induction chemotherapy in individuals with germinomas and NGGCT	• MRI Brain without and with contrast (CPT® 70553) every 2 cycles
Additional treatment response to induction chemotherapy for individuals with germinomas and NGGCT with measurable spinal cord disease on MRI	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 2 cycles
End of induction chemotherapy for individuals with germinomas and NGGCT with localized intracranial tumors	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Prior to second-look surgery in individuals with germinomas and NGGCT	• MRI of all known sites of measurable disease
Prior to radiotherapy in individuals with germinomas and NGGCT	• MRI of all known sites of measurable disease

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Indication	Medically Necessary Imaging Study
At the end of all planned therapy in individuals with germinomas and NGGCT	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine (with or without and with contrast)
Signs or symptoms of recurrence or progression in individuals with germinomas and NGGCT	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Surveillance in individuals with germinomas and NGGCT	• Every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually until 5 years after completion of therapy: ◦ MRI Brain without and with contrast (CPT® 70553) ◦ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)**
Suspected recurrence - new or worsening neurologic symptoms (including worsening of diabetes insipidus) in individuals with germinomas and NGGCT	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

Background and Supporting Information

- Germinomas and NGGCT most frequently affect older school aged children and adolescents, though they can occur across the pediatric age spectrum (PDQ® Pediatric Treatment Editorial Board, 2025).
- Germinomas are highly sensitive to chemotherapy and radiotherapy and are associated with excellent long-term survival rates, often exceeding 90%, whereas

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NGGCTs have a less favorable prognosis and require more intensive therapy (NCCN, 2025).
- Leptomeningeal dissemination is common at diagnosis, supporting the need for neuraxis evaluation during staging (PDQ® Pediatric Treatment Editorial Board, 2025).

Evidence Discussion

- Brain and spine MRI at diagnosis is supported by evidence demonstrating frequent multifocal and metastatic disease that alters staging and treatment planning (NCCN, 2025).
- Surveillance imaging following chemotherapy and/or radiotherapy enables detection of residual or recurrent disease while avoiding unnecessary imaging once disease stability is established (PDQ® Pediatric Treatment Editorial Board, 2025).
- Guideline-directed imaging intervals help minimize anesthesia exposure and cumulative imaging burden without compromising excellent outcomes in germinoma patients (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

Germinomas and NGGCTs are rare pediatric malignancies with distinct biology, treatment intensity, and long term outcomes, yet substantial disparities persist in presentation patterns, survival, and survivorship burden across sex, age, and resource settings. Population-based analyses demonstrate marked sex-based disparities, with males experiencing higher incidence and, particularly for NGGCTs, higher early mortality risk compared with females (Lin et al., 2025). Disease stage at diagnosis is a critical determinant of outcomes; patients presenting with distant or metastatic disease experience significantly worse survival, highlighting the impact of delayed diagnosis and barriers to timely neuroimaging and comprehensive staging (Lin et al., 2025). Global and regional cohort studies further demonstrate that children treated in low and middle income or upper middle income settings face challenges related to access to standardized molecular diagnostics, advanced imaging, and treatment intensification strategies, contributing to outcome variability, especially for NGGCTs (Cappellano et al., 2024).

Equity considerations extend beyond initial cure to long-term survivorship, with direct implications for imaging surveillance and follow-up care. Despite excellent short term survival for germinomas, long term survivors experience substantially increased risks of late mortality, including recurrent disease, secondary malignancies, and cerebrovascular events, underscoring the importance of consistent access to longitudinal imaging and specialized survivorship monitoring across all populations (Acharya et al., 2014). Treatment paradigms increasingly rely on response-adapted strategies that integrate chemotherapy with reduced field or reduced dose radiation, placing added importance on high-quality imaging to guide risk stratification and minimize late toxicities; however,

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access to these approaches is uneven globally and within health systems (Hill Kayser et al., 2020; Cappellano et al., 2024). Timely diagnostic and staging imaging, equitable access to response-based surveillance strategies, and coordinated long term follow-up are necessary to reduce preventable disparities in survival and late effects among diverse pediatric and adolescent populations (Acharya et al., 2014; Lin et al., 2025).

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Ependymal Tumors (Ependymoma) (PEDONC-4.8)

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Criteria

- PET Brain Metabolic imaging does not have a defined role in the evaluation of ependymal tumors and therefore is considered not medically necessary.
- MR Spectroscopy is not considered medically necessary for routine surveillance of ependymal tumors.
- Individuals with ependymal tumors with a complete resection should be imaged according to surveillance guidelines.
- Individuals with ependymal tumors with incomplete resection or high-risk histology that receive adjuvant radiation therapy should be imaged according to surveillance guidelines after end of radiotherapy imaging.
- RELA-fusion supratentorial ependymoma did not portend worse overall survival outcomes in recent Clinical Oncology Group studies, and is not considered an indication for more frequent surveillance imaging.
- Includes the following tumors:
  - Ependymal tumors
    - Supratentorial ependymoma
    - ZFTA fusion-positive Supratentorial ependymoma
    - YAP1 fusion-positive Posterior fossa ependymoma
    - Posterior fossa ependymoma, group
    - PFA Posterior fossa ependymoma, group PFB

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning in individuals with ependymal tumors	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**

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Indication	Medically Necessary Imaging Study
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed in individuals with ependymal tumors	• MR Spectroscopy (CPT® 76390)
Baseline imaging following resection in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s)
Completion of radiotherapy in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s)
Prior to radiotherapy in individuals with ependymal tumors	• MRI of all known sites of measurable disease
Treatment response to induction chemotherapy in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s) every 2 cycles
End of induction chemotherapy and again at end of all therapy in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Prior to second-look surgery in individuals with ependymal tumors	• MRI of all known sites of measurable disease
Signs or symptoms of recurrence,progression, or neurologic emergency in individuals with ependymal tumors	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Surveillance, primary intra**cranial** ependymal tumor and NO history of spinal cord involvement	• MRI Brain without and with contrast (CPT® 70553) every 3 months for 2 years, then every 4 months for 1 year, then every 6 months in years 4 and 5, then annually to 10 years post treatment ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)** • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved annually for 2 years
Surveillance, primary intra**cranial** ependymal tumor AND metastatic cord involvement at diagnosis	• MRI Brain without and with contrast (CPT® 70553) every 3 months for 2 years, then every 4 months for 1 year, then every 6 months in years 4 and 5, then annually to 10 years post treatment ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see: **Second Malignant Neoplasms (SMN) (PEDONC-19.3)** • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 3 months for 2 years, then every 4 months for 1 year, then every 6 months in years 4 and 5, then annually to 10 years post treatment

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Indication	Medically Necessary Imaging Study
Surveillance, primary intra**spinal** ependymal tumor and NO history of intracranial involvement	• MRI without and with contrast of the involved spinal level(s) every 3 months for 2 years, then every 4 months for 1 year, then every 6 months in years 4 and 5, then annually to 10 years post treatment
Surveillance, primary intra**spinal** ependymal tumor AND metastatic intracranial involvement at diagnosis	• MRI of the involved spinal level(s) without and with contrast every 3 months for 2 years, then every 4 months for 1 year, then every 6 months in years 4 and 5, then annually to 10 years post treatment • MRI Brain without and with contrast (CPT® 70553) every 3 months for 2 years, then every 4 months for 1 year, then every 6 months in years 4 and 5, then annually to 10 years post treatment

Background and Supporting Information

- Ependymal tumors arise from ependymal cells lining the ventricular system and spinal canal and include multiple molecularly defined entities, with approximately two-thirds occurring intracranially in the posterior fossa (NCCN, 2025).
- Prognosis is generally favorable, particularly for supratentorial tumors and those undergoing gross total resection, though molecular features such as chromosome 1q gain are associated with worse outcomes (NCCN, 2025).
- Primary spinal ependymomas occur less frequently in children than adults but follow similar treatment principles (PDQ® Pediatric Treatment Editorial Board, 2025).
- Surgical resection is the primary treatment, with adjuvant radiation therapy used for incompletely resected or high risk tumors (NCCN, 2025).

Evidence Discussion

- Postoperative MRI is critical for determining extent of resection, which is the most important prognostic factor in pediatric ependymoma (NCCN, 2025).
- Surveillance imaging following surgery or radiotherapy facilitates early identification of recurrence, which may be amenable to re-resection or salvage therapy (PDQ® Pediatric Treatment Editorial Board, 2025).

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- Restricting imaging to guideline-supported intervals balances the benefit of early detection against the risks of repeated sedation and imaging in long-term survivors (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

Ependymomas are rare pediatric central nervous system tumors with heterogeneous clinical behavior and long survivorship, yet substantial disparities exist in access to care, treatment delivery, and long-term outcomes across socioeconomic and demographic groups. Population-based analyses demonstrate that uninsured and socioeconomically disadvantaged children experience worse perioperative outcomes, including significantly prolonged hospital length of stay, which can reflect delayed presentation, barriers to timely postoperative care, and limited access to supportive services (Jagtiani et al., 2024). Racial and ethnic disparities in care have also been identified, with Black children exhibiting lower odds of undergoing tumor resection and Hispanic patients experiencing longer postoperative hospitalizations, suggesting the influence of structural inequities, differences in access to high volume surgical centers, and downstream barriers to specialty referral (Jagtiani et al., 2024). These disparities are particularly consequential in ependymoma, where extent of safe surgical resection and timely radiotherapy are critical determinants of survival.

Equity considerations extend well beyond initial treatment, as survivors of childhood ependymoma face a substantial and lifelong burden of medical and functional morbidity with important implications for imaging surveillance and long-term follow up. Population-based survivorship studies demonstrate markedly increased risks of stroke, severe hearing loss, subsequent malignant neoplasms, disability, mental health service utilization, and premature mortality among ependymoma survivors compared with the general population, even in cohorts with limited exposure to chemotherapy and predominantly focal radiation (Coltin et al., 2024). These long-term risks underscore the need for consistent access to longitudinal neuroimaging, multidisciplinary survivorship care, and supportive services - resources that may be unevenly available across healthcare systems and communities. Timely diagnostic imaging, referral to experienced neurosurgical and radiation centers, and standardized long-term surveillance strategies are necessary to reduce preventable disparities in treatment outcomes and survivorship burden across diverse pediatric populations (Coltin et al., 2024; Jagtiani et al., 2024).

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Malignant Tumors of the Spinal Cord (PEDONC-4.9)

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Criteria

- If a disease-specific guideline exists, image according to the guidance found in that disease-specific guideline section.
- Treatment principles for malignant tumors of the spinal cord are the same as tumors of the brain, and should follow imaging guidelines according to the specific histologic type.
- Asymptomatic surveillance imaging for tumors of the spinal cord should generally end at the time point appropriate for the specific tumor type.
- Common histologies of primary spinal cord tumor in children include:
  - Low-Grade Glioma, see: **CNS Low Grade Glioma (LGG) (PEDONC-4.2)** for guidelines
  - High-Grade Glioma, see: **CNS High-Grade Glioma (HGG) (PEDONC-4.3)** for guidelines
  - Ependymoma, see: **Ependymal Tumors (Ependymoma) (PEDONC-4.8)** for guidelines
  - NF 1 or 2, see **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** for guidelines
  - Any type of malignant spinal cord tumor can occur, but other histologies are rare.

For rare histologies that do not have a disease-specific guideline section, follow the imaging outlined in the table below.

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with tumors of the spinal cord	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning in individuals with tumors of the spinal cord	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**

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Indication	Medically Necessary Imaging Study
Treatment response in individuals with tumors of the spinal cord, every 2 cycles	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • Additionally, MRI Brain without and with contrast (CPT® 70553) for known intracranial disease
Signs or symptoms of recurrence or progression in individuals with tumors of the spinal cord	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) • Additionally, MRI Brain without and with contrast (CPT® 70553) for known intracranial disease
Surveillance of rare histologies is highly individualized. Surveillance imaging after recent evaluation by a physician with significant training and/or experience in pediatric spinal cord tumors (most commonly a pediatric neurosurgeon or pediatric oncologist) may be considered medically necessary in these rare individuals	• MRI Brain and/or MRI Spine may be considered

Background and Supporting Information

- Malignant tumors of the spinal cord in children are rare and include astrocytomas, ependymomas, and other histologies that share management principles with their intracranial counterparts (PDQ® Pediatric Treatment Editorial Board, 2025).
- Multiple spinal cord tumors raise suspicion for underlying genetic syndromes such as neurofibromatosis (NCCN, 2025).
- Treatment and imaging strategies are dictated by histology, extent of disease, and neurological status (NCCN, 2025).

Evidence Discussion

- MRI of the spine is the preferred imaging modality for diagnosis, staging, and follow-up due to superior soft tissue contrast and lack of ionizing radiation (NCCN, 2025).
- Surveillance imaging is supported during periods of highest recurrence risk and should generally conclude according to timeframes established for the specific tumor type once stability is achieved (Expert Panel on Neurological Imaging, 2019).

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Health Equity Considerations

Malignant tumors of the spinal cord represent a rare and clinically complex subset of pediatric CNS tumors, and children with these diagnoses face unique equity related challenges across diagnosis, treatment, and research participation. Despite accounting for approximately 10% of pediatric CNS tumors, spinal cord tumors remain markedly underrepresented in clinical trials, with only a small fraction of CNS trials explicitly including spinal tumors and virtually none dedicated specifically to primary pediatric spinal cord malignancies (Villanueva et al., 2024). This underrepresentation limits the development of evidence-based treatment pathways and contributes to variability in clinical management, as pediatric patients are often treated using protocols extrapolated from adult spinal or intracranial tumor studies (Villanueva et al., 2024). Geographic concentration of trials in high income regions, particularly North America, further restricts equitable access to investigational therapies for children treated outside major academic centers or in resource limited settings (Villanueva et al., 2024).

Health equity considerations for malignant spinal cord tumors also extend to diagnostic imaging, surgical decision making, and long-term functional outcomes. Maximal safe surgical resection is the primary treatment modality for many pediatric spinal cord malignancies, yet tumor infiltration of critical neural tracts frequently limits resectability and increases the risk of permanent neurologic morbidity, underscoring the need for high-quality imaging and specialized surgical expertise that may not be uniformly accessible across health systems (Villanueva et al., 2024). The absence of standardized, tumor-specific surveillance and imaging guidelines, coupled with limited data on the efficacy of adjuvant radiation or systemic therapy, disproportionately affects patients treated outside specialized centers with multidisciplinary pediatric neuro-oncology expertise (Villanueva et al., 2024). Timely access to high resolution diagnostic and surveillance imaging, referral to experienced pediatric spine oncology centers, and inclusion of spinal cord tumor-specific cohorts within CNS clinical trials are necessary to reduce preventable disparities in outcomes for children with malignant spinal cord tumors (Villanueva et al., 2024).

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Craniopharyngioma and Other Tumors of the Sellar Region (PEDONC-4.10)

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Criteria

- Individuals of all ages should be imaged according to these guidelines.
- PET Brain Metabolic Imaging and MR Spectroscopy do not have a defined role in the evaluation of craniopharyngioma and are, therefore, considered not medically necessary.
- Includes the following tumors:
  - Craniopharyngioma
  - Papillary craniopharyngioma
  - Pituicytoma, granular cell tumor of the sellar region, and spindle cell oncocytoma
  - PitNET
  - Pituitary blastoma
- Other less common tumors in the optic chiasm, sella, and suprasella region may include Germ Cell Tumors (GCT, see: **PEDONC-4.7**) and Langerhans Cell Histiocytosis (LCH, see: **PEDONC-18**).
- Imaging guidelines and treatment approaches for pediatric pituitary tumors other than those listed below are consistent with those used for adults with pituitary tumors.
  - For these tumors, follow guidelines in **Pituitary, Sella, Hypothalamus (HD-19)** in the Head Imaging Guidelines.
- Several key imaging findings can be used to differentiate the tumors in this region, including the presence of calcifications, cysts, and T1/T2 enhancement patterns in craniopharyngiomas.
  - These are best evaluated using a COMBINATION of both MRI and CT modalities. Preoperative prediction is much more successful when BOTH modalities are obtained prior to biopsy.
  - Those with craniopharyngioma with a complete resection should be imaged according to surveillance guidelines after post-resection imaging is completed.
- Individuals with craniopharyngioma with incomplete resection and receiving adjuvant radiation therapy can have a single MRI Brain (CPT® 70553) approved at completion of radiotherapy and should then be imaged according to surveillance guidelines.

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Indication	Medically Necessary Imaging Study
Initial staging for all individuals with craniopharyngioma and other tumors of the sellar region	• MRI Brain without and with contrast (CPT® 70553) ◦ Concurrent CT Head without contrast (CPT® 70450) in addition to MRI if craniopharyngioma is suspected
In addition to the above imaging, for preoperative planning in individuals with craniopharyngioma and other tumors of the sellar region	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**
• Additional initial staging for individuals with craniopharyngioma and other tumors of the sellar region with: ◦ Multicentric tumors ◦ Clinical signs or symptoms suggesting spinal cord involvement	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Operative planning or image guidance in individuals with craniopharyngioma and other tumors of the sellar region	• MRA Head (CPT® 70544, 70545, or 70546) OR • CTA Head (CPT® 70496)
Baseline imaging following resection in individuals with craniopharyngioma and other tumors of the sellar region	• MRI Brain without and with contrast (CPT® 70553)
Completion of radiotherapy in individuals with craniopharyngioma and other tumors of the sellar region	• MRI Brain without and with contrast (CPT® 70553)
Treatment response to chemotherapy in individuals with craniopharyngioma and other tumors of the sellar region	• MRI Brain without and with contrast (CPT® 70553) approved every 2 cycles during active treatment and at the end of planned chemotherapy

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Indication	Medically Necessary Imaging Study
Additional treatment response imaging during induction chemotherapy for individuals with craniopharyngioma and other tumors of the sellar region with measurable spinal cord disease on MRI	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 2 cycles
Signs or symptoms of recurrence or progression in individuals with craniopharyngioma and other tumors of the sellar region	• MRI Brain without and with contrast (CPT® 70553) ◦ Concurrent CT Head without contrast (CPT® 70450) in addition to MRI for craniopharyngioma • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) for signs or symptoms suggesting spinal cord involvement
Surveillance in individuals with craniopharyngioma and other tumors of the sellar region	• MRI Brain without and with contrast (CPT® 70553) can be approved every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually until 10 years after completion of therapy as late progressions can occur ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see **Second Malignant Neoplasms (SMN) (PEDONC-19.3)**.
Suspected spinal cord recurrence in individuals with craniopharyngioma and other tumors of the sellar region	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

Background and Supporting Information

- Craniopharyngiomas account for approximately 6%–8% of pediatric CNS tumors and most commonly present in pre-adolescent children (PDQ® Pediatric Treatment Editorial Board, 2025).
- These tumors arise in the sellar and suprasellar region and are frequently cystic and calcified, often causing endocrine dysfunction and visual impairment (NCCN, 2025).

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- MRI provides optimal soft tissue characterization, while CT is particularly useful for identifying calcifications, supporting the use of complementary modalities in preoperative assessment (Expert Panel on Neurological Imaging, 2019).
- Other rare sellar region tumors include pituitary blastoma, pituicytoma, and pituitary neuroendocrine tumors (PitNETs) (PDQ® Pediatric Treatment Editorial Board, 2025).

Evidence Discussion

- Combined MRI and CT improves diagnostic accuracy and surgical planning compared with either modality alone (Expert Panel on Neurological Imaging, 2019).
- Surveillance imaging following resection or radiotherapy detects cystic recurrence, which is common and may be asymptomatic initially (NCCN, 2025).
- Guideline-directed imaging minimizes unnecessary repeat studies while preserving the ability to detect clinically relevant disease progression (PDQ® Pediatric Treatment Editorial Board, 2025).

Health Equity Considerations

Craniopharyngioma and other tumors of the sellar region require highly specialized, multidisciplinary care, and substantial health equity challenges exist across diagnosis, treatment, imaging surveillance, and long-term follow-up. Delayed diagnosis is common due to the insidious onset of symptoms such as growth failure, visual disturbance, or endocrine dysfunction, with prolonged symptom duration disproportionately reported in low and middle income countries (LMICs) and underserved populations, contributing to worse functional outcomes at presentation (Baqai etal., 2024; Memon et al., 2023; Tenorio et al., 2025). Access to advanced neuroimaging, experienced neurosurgical teams, and hypothalamus sparing surgical approaches varies widely, often resulting in greater hypothalamic and pituitary injury in settings with limited subspecialty resources (Beckhaus et al., 2023; Şıklar et al., 2024). International and cross-border data further demonstrate that disparities in postoperative endocrine care and treatment adherence, rather than tumor recurrence alone, are strongly associated with reduced overall survival, underscoring the critical role of longitudinal care access beyond initial surgical management (Tenorio et al., 2025).

Long-term survivorship following sellar region tumors is characterized by high rates of permanent endocrine deficiencies, hypothalamic obesity, visual impairment, and neuropsychological morbidity, all of which necessitate ongoing imaging, endocrine surveillance, and coordinated multidisciplinary follow-up that may not be equitably available (Beckhaus et al., 2023; Şıklar et al., 2024). Studies from LMIC settings highlight significant loss to follow-up, limited access to routine MRI surveillance, and socioeconomic barriers that impede timely monitoring for recurrence and management of late effects, thereby amplifying disparities in quality of life and functional outcomes (Baqai et al., 2024; Memon et al., 2023). Caregiver burden and long-term dependency, particularly in patients with hypothalamic damage, disproportionately affect families

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with fewer financial and social supports, further reinforcing inequities in survivorship outcomes (Beckhaus et al., 2023). Timely diagnostic imaging, standardized surveillance strategies, and referral to experienced multidisciplinary centers, with particular attention to improving access to long-term endocrine and neuroimaging follow-up for individuals treated in resource-limited and marginalized settings are needed to reduce disparities in this population (Şıklar et al., 2024; Tenorio et al., 2025).

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Primary CNS Lymphoma (PEDONC-4.11)

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Criteria

- Primary CNS lymphoma imaging indications in pediatric individuals are identical to those in the general imaging guidelines. See: **CNS Lymphoma (ONC-2.7)** in the Oncology Imaging Guidelines.
  - Usually associated with immunodeficiency, this is a very rare entity in pediatrics accounting for <0.1% of pediatric malignancies, so age-specific guidelines have not been established.
- CNS lymphomas also involving bone marrow and/or lymph nodes should be imaged according to: **Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) (PEDONC-5.3)**.

Background and Supporting Information

- Primary CNS lymphoma is defined as lymphoma confined to the brain, leptomeninges, spinal cord, or eyes without systemic involvement at diagnosis (NCCN, 2025).
- This entity is rare in children and is most often of diffuse large B-cell histology (PDQ® Pediatric Treatment Editorial Board, 2025).
- Lesions may be solitary or multifocal and frequently involve deep brain structures (NCCN, 2025).

Evidence Discussion

- MRI with contrast is essential for diagnosis and response assessment, as lesions demonstrate characteristic enhancement patterns (NCCN, 2025).
- Surveillance imaging supports early detection of relapse, which is common despite initial response to therapy (PDQ® Pediatric Treatment Editorial Board, 2025).
- Avoidance of unnecessary imaging outside recommended intervals reduces exposure to sedation and contrast related risks (Expert Panel on Neurological Imaging, 2019).

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Meningiomas (PEDONC-4.12)

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Criteria

- Meningioma imaging indications in pediatric individuals are identical to those in the general imaging guidelines
  - See: **Meningiomas (Intracranial and Intraspinal) (ONC-2.8)** in the Oncology Imaging Guidelines

Background and Supporting Information

- Pediatric meningiomas account for approximately 1%–3% of pediatric CNS tumors and are more frequently associated with NF2 or prior cranial radiotherapy (PDQ® Pediatric Treatment Editorial Board, 2025).
- Radiation-induced meningiomas may occur decades after exposure, underscoring the importance of long-term follow-up in survivors (NCCN, 2025).
- Most pediatric meningiomas are slow growing and amenable to surgical cure (PDQ® Pediatric Treatment Editorial Board, 2025).

Evidence Discussion

- MRI is the preferred modality for diagnosis and surveillance, enabling assessment of tumor growth and involvement of adjacent structures (NCCN, 2025).
- Surveillance imaging is generally prolonged in individuals with incomplete resection or genetic predisposition due to higher recurrence risk (PDQ® Pediatric Treatment Editorial Board, 2025).
- Imaging strategies guided by clinical risk factors optimize early detection while limiting unnecessary studies (Expert Panel on Neurological Imaging, 2019).

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Choroid Plexus Tumors (PEDONC-4.13)

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Criteria

- PET Metabolic Brain imaging does not have a defined role in the evaluation of choroid plexus tumors and is, therefore, considered not medically necessary.
- Spinal imaging may be approved for Choroid Plexus Adenoma or Atypical Choroid Plexus Papilloma if requested at initial diagnosis.
- For choiroid plexus carcinoma:
  - Individuals with confirmed gross total resection should be imaged according to surveillance guidelines.
  - Individuals with incomplete resection who receive adjuvant radiation therapy should be imaged according to surveillance guidelines after end of radiotherapy imaging.
  - MR Spectroscopy is not considered medically necessary for routine surveillance.

Choroid Plexus Papilloma:

Indication	Medically Necessary Imaging Study
Suspected/Diagnosis of choroid plexus papilloma	• MRI Brain without and with contrast (CPT® 70553)
In addition to the above imaging, for preoperative planning in individuals with choroid plexus papilloma	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed in individuals with choroid plexus papilloma	• MR Spectroscopy (CPT® 76390)
Suspected return of hydrocephalus, or return of hydrocephalus seen on CT imaging in individuals with choroid plexus papilloma	• MRI Brain without and with contrast (CPT® 70553)

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Choroid Plexus Adenoma or Atypical Choroid Plexus Papilloma:

Indication	Medically Necessary Imaging Study
Suspected/Diagnosis of choroid plexus adenoma or atypical choroid plexus papilloma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning in individuals with choroid plexus adenoma or atypical choroid plexus papilloma	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed in individuals with choroid plexus adenoma or atypical choroid plexus papilloma	• MR Spectroscopy (CPT® 76390)
Suspected return of hydrocephalus, or return of hydrocephalus seen on CT imaging in individuals with choroid plexus adenoma or atypical choroid plexus papilloma	• MRI Brain without and with contrast (CPT® 70553)

Choroid Plexus Carcinoma:

Indication	Medically Necessary Imaging Study
Initial staging of all individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
In addition to the above imaging, for preoperative planning in individuals with choroid plexus carcinoma	• Functional MRI (fMRI) (CPT® 70555 or 70554) • For further perioperative indications, please refer to **Neuronavigation (HD-28.2)**

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Indication	Medically Necessary Imaging Study
Evaluation of a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/ resection can be safely postponed in individuals with choroid plexus carcinoma	• MR Spectroscopy (CPT® 76390)
Baseline imaging following resection in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553)
Prior to radiotherapy in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553) and MRI with and without contrast of all known sites with measurable disease prior to radiotherapy
Completion of radiotherapy in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553)
Treatment response to chemotherapy in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553) every 2 cycles during active treatment
Additional treatment response to chemotherapy for individuals with choroid plexus carcinoma with measurable spinal cord disease on MRI	• MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 2 cycles during active treatment
Prior to second-look surgery in individuals with choroid plexus carcinoma	• MRI of all known sites of measurable disease
End of all planned therapy in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Signs or symptoms of recurrence or progression in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Surveillance, no history of spinal cord involvement in individuals with choroid plexus carcinoma	• MRI Brain without and with contrast (CPT® 70553) every 4 months for 3 years, then every 6 months for 2 years after completion of therapy, then annually to 10 years after treatment ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see **Second Malignant Neoplasms (SMN) (PEDONC-19.3)**. • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) at 12 and 24 months after completion of therapy
Surveillance, individuals with choroid plexus carcinoma with cord involvement at diagnosis	• MRI Brain without and with contrast (CPT® 70553) every 4 months for 3 years, then every 6 months for 2 years after completion of therapy, then annually to 10 years after treatment ◦ For additional imaging guidelines for individuals in long term follow up after CNS tumor treatment that included radiation therapy, see **Second Malignant Neoplasms (SMN) (PEDONC-19.3).** • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) every 4 months for 3 years, then every 6 months for 2 years after completion of therapy, then annually to 10 years after treatment

Background and Supporting Information

- Choroid plexus tumors, including papilloma, atypical papilloma, adenoma, and carcinoma, account for approximately 1%–4% of pediatric CNS tumors and most commonly occur in infants under 2 years of age (PDQ® Pediatric Treatment Editorial Board, 2025).

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- Papillomas and atypical papillomas are typically benign or intermediate grade lesions with excellent prognosis following surgical resection (NCCN, 2025).
- Choroid plexus carcinomas are highly aggressive, with frequent metastasis and poorer survival outcomes, particularly in association with TP53 mutations (PDQ® Pediatric Treatment Editorial Board, 2025).

Evidence Discussion

- MRI provides characteristic imaging appearances that often allow confident diagnosis and surgical planning (NCCN, 2025).
- Spinal imaging is necessary at diagnosis for carcinoma due to high metastatic risk but is not routinely necessary for benign subtypes (PDQ® Pediatric Treatment Editorial Board, 2025).
- Surveillance imaging tailored to tumor histology and extent of resection balances recurrence detection against the risks of repeated imaging and anesthesia (Expert Panel on Neurological Imaging, 2019).

Health Equity Considerations

Choroid plexus tumors, including choroid plexus papilloma and carcinoma, are rare pediatric central nervous system tumors that disproportionately affect very young children, with the majority of malignant cases diagnosed before five years of age (Dudley et al., 2015). This early age of onset poses significant equity challenges, as infants and toddlers depend on timely access to advanced neuroimaging, neurosurgical expertise, and specialized perioperative care, which may not be uniformly available across healthcare systems. Population-based data demonstrate high overall surgical intervention rates for both benign and malignant choroid plexus tumors, yet survival outcomes for choroid plexus carcinoma remain poor despite aggressive treatment, underscoring the importance of early diagnosis and access to high volume pediatric neurosurgical centers with experience managing highly vascular intraventricular tumors (Dudley et al., 2015). Limitations in imaging availability, delayed diagnosis of hydrocephalus, and variability in referral pathways may disproportionately affect children from underserved or rural communities, potentially contributing to worse neurologic morbidity and survival outcomes.

Health equity considerations for choroid plexus tumors also extend to the availability of adjuvant therapies, longitudinal imaging surveillance, and supportive care resources. National registry data indicate variation in the use of radiation therapy by age, with substantially lower utilization in children younger than five years due to concerns regarding neurodevelopmental toxicity, highlighting the need for individualized imaging and treatment strategies tailored to developmental stage and resource availability (Dudley et al., 2015). Importantly, large administrative datasets lack information on socioeconomic status, chemotherapy use, hydrocephalus management, and long-term

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functional outcomes, limiting the ability to fully characterize disparities in survivorship and quality of life (Dudley et al., 2015). Timely diagnostic neuroimaging for infants presenting with signs of hydrocephalus, coordinated referral to specialized pediatric centers, and consistent post-treatment surveillance imaging are necessary to monitor for recurrence and treatment related complications, particularly for individuals treated outside major tertiary care settings.

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Pediatric Lymphomas (PEDONC-5)

Guideline

Pediatric Lymphoma – General Considerations (PEDONC-5.1)
Pediatric Hodgkin Lymphoma (HL) (PEDONC-5.2)
Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) (PEDONC-5.3)
Anaplastic Large Cell Lymphoma (ALCL) (PEDONC-5.4)
References (PEDONC-5)

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Pediatric Lymphoma – General Considerations (PEDONC-5.1)

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Criteria

- Lymphoma most commonly involves the lymph nodes (LNs). However, lymphoma can also arise from primary lymphoid tissues (bone marrow or thymus) or various secondary lymphoid tissues (spleen, mucosa-associated lymphoid tissue) or non-lymphoid organs (skin, bone, brain, lungs, liver, salivary glands, etc.).
- Pediatric lymphomas are generally Hodgkin Lymphomas, Aggressive B-Cell Non-Hodgkin Lymphomas, Lymphoblastic Lymphomas, or Anaplastic Large Cell Lymphomas
- Individuals with Lymphoblastic Lymphoma (even those with bulky nodal disease) are treated using the leukemia treatment plan appropriate to the cell type (B or T cell).
  - These individuals should be imaged using guidelines in **Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)**
- Other histologies are rare in pediatric individuals, and should be imaged according to the following guidelines:
  - Follicular lymphoma: **Follicular Lymphoma (ONC-27.3)** in the Oncology Imaging Guidelines
  - Marginal zone or MALT lymphomas: **Marginal Zone Lymphomas (ONC-27.4)** in the Oncology Imaging Guidelines
  - Mantle cell lymphomas: **Mantle Cell Lymphoma (ONC-27.5)** in the Oncology Imaging Guidelines
  - Cutaneous lymphomas: **Cutaneous Lymphomas and T Cell Lymphomas (ONC-27.8)** in the Oncology Imaging Guidelines
    - **Exception:** Cutaneous B-Lymphoblastic Lymphoma should be imaged using guidelines in **Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)**
  - Castleman's Disease: **Castleman's Disease (Unicentric and Multicentric) (ONC-31.11)** in the Oncology Imaging Guidelines
- All CT imaging recommended in this section refers to CT with contrast only.
  - Non-contrast CT imaging has not been shown to be beneficial in the management of pediatric lymphomas
  - Given the limited utility of non-contrast CT imaging in pediatric lymphomas, MRI without **or** without and with contrast is considered medically necessary in place of CT for individuals who cannot tolerate CT contrast due to allergy or impaired renal function.

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- MRI without and with contrast of symptomatic or previously involved bony areas is considered medically necessary in individuals with known lymphoma without prior plain x-ray or bone scan evaluation.
  - Bone scan is inferior to MRI for evaluation of known or suspected bone metastases in lymphoma.
- MRI Brain without and with contrast (CPT® 70553) is considered medically necessary as it is the preferred study for evaluation of suspected brain metastases in pediatric lymphoma.
  - CT Head with (CPT® 70460) or without and with contrast (CPT® 70470) is considered medically necessary when MRI is contraindicated.

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Pediatric Hodgkin Lymphoma (HL) (PEDONC-5.2)

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Criteria

- Indications and coding for rare circumstances where PET/MRI may be approved are found in **PET imaging in Pediatric Oncology (PEDONC-1.4)**

Indication	Medically Necessary Imaging Study
Initial staging of HL	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) ◦ MRI Neck without and with contrast (CPT® 70543) as a substitute for CT to limit radiation exposure if requested • CT Chest with contrast (CPT® 71260) ◦ MRI is not a substitution for CT Chest • CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast as substitute for CT to limit radiation exposure if requested • MRI Brain without and with contrast (CPT® 70553) for known CNS involvement or new signs or symptoms suggesting intracranial disease • PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) ◦ Can be performed prior to biopsy if necessary for individual scheduling • CT or MRI of other body areas may be indicated for rare individuals based on physical findings or PET/CT results

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Indication	Medically Necessary Imaging Study
Restaging of HL	• ALL of the following, as often as every 2 cycles of chemotherapy: ◦ CT of previously involved visceral areas ▪ In individuals on treatment for recurrent or refractory Hodgkin Lymphoma, all of the following: - CT Neck with contrast (CPT® 70491) - CT Chest with contrast (CPT® 71260) - CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Brain without and with contrast (CPT® 70553) for known CNS involvement AND • After cycles 2 and 4* of chemotherapy and at end of therapy: ◦ PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (only using combination of CPT® 78813 and 76498) ▪ *For individuals with low-risk stage IA or IIA mixed cellularity Hodgkin lymphoma, this restaging PET/CT is considered medically necessary after cycles 1 and 3 (instead of cycles 2 and 4) if requested. End of therapy PET/CT or PET/MRI is considered medically necessary for all individuals with Hodgkin lymphoma. ◦ Diagnostic CT or MRI of previously involved areas may be combined with PET at end of therapy. ◦ For individuals with Waldeyer's Ring involvement, CT Neck with contrast (CPT® 70491) or MRI Orbit/Face/Neck without and with contrast (CPT® 70543) may be done in addition to the above studies after cycles 2 and 4 and at end of therapy • In addition to the above studies: ◦ If end of therapy PET/CT or PET/MRI done prior to radiation therapy documents Deauville 4 or 5 FDG avidity, one follow-up PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI is considered medically necessary >12 weeks after radiation therapy to confirm complete response.

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Indication	Medically Necessary Imaging Study
Surveillance for individuals with no history of recurrent HL	• Imaging studies are only considered medically necessary when relapse is clinically suspected, because most individuals will clinically declare themselves and there is no survival advantage in pre-emptive imaging. • **Routine surveillance imaging is not considered medically necessary in individuals without a prior history of recurrent disease**
Surveillance, individuals with **recurrent** HL and no evidence of disease following successful treatment	• ALL of the following, every 3 months for 2 years after completing therapy for recurrence: ◦ CT Neck with contrast (CPT® 70491) ◦ CT Chest with contrast (CPT® 71260) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177)
Clarify inconclusive findings on conventional imaging suspicious for recurrence AND considering biopsy to establish recurrence in individuals with HL	• PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498)

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Indication	Medically Necessary Imaging Study
Clinical symptoms suggesting recurrence of HL	• MRI Brain without and with contrast (CPT® 70553) for known CNS involvement or new signs or symptoms suggesting intracranial disease AND either of the following sets of imaging: • Conventional imaging: ◦ CT Neck with contrast (CPT® 70491) OR MRI Neck without and with (CPT® 70491) AND ◦ CT Chest with contrast (CPT® 71260) AND ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) OR MRI Abdomen and MRI Pelvis without and with contrast (CPT® 74183 and CPT® 72197) AND ◦ CT of other previously involved visceral areas or currently symptomatic areas OR • PET/CT (CPT® 78815 or 78816) or PET/MRI (CPT® 78813 and CPT® 76498)

Background and Supporting Information

- Pediatric HL is a malignant lymphoma arising from the lymphatic system and is classified into classic HL and nodular lymphocyte predominant HL according to contemporary classification systems, with management guided by pediatric cooperative group protocols (NCCN, 2025).
- HL in pediatric individuals is primarily a nodal disease, with frequent involvement of cervical, supraclavicular, and mediastinal lymph nodes; extranodal involvement is less common and typically associated with more advanced disease (Mhlanga et al., 2023).
- Staging is performed using the Ann Arbor staging system with Cotswolds modifications, incorporating disease distribution, bulky disease, and clinical symptoms, which collectively inform risk stratification and treatment planning (Mhlanga et al., 2023; NCCN, 2025).
- Contemporary pediatric HL treatment relies on response-adapted therapy, where early treatment response assessed by both anatomic and metabolic imaging is used to modify chemotherapy intensity and determine the need for radiotherapy (NCCN, 2025).

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Evidence Discussion

- Evidence from large pediatric cohorts demonstrates that most HL relapses are identified by clinical findings, including symptoms, laboratory abnormalities, or physical examination, rather than by routine surveillance imaging (Voss et al., 2012).
- Surveillance CT imaging after completion of therapy has not been shown to improve post recurrence overall survival, as the time to relapse, rather than the method of detection, is the primary determinant of outcome (Voss et al., 2012).
- NCCN pediatric HL guidelines recommend against routine pre-emptive surveillance imaging, supporting imaging only when relapse is clinically suspected (NCCN, 2025).
- FDG-PET combined with CT plays an essential role during initial staging and early response assessment, as treatment decisions frequently depend on both metabolic response and anatomic tumor regression (Mhlanga et al., 2023; NCCN, 2025).

Health Equity Considerations

Pediatric HL is highly curable, yet marked inequities persist in stage at diagnosis, treatment delivery, and outcomes across racial, ethnic, and socioeconomic groups. Multiple population-based and cooperative group studies demonstrate that Black and Hispanic children and adolescents are more likely to present with advanced stage HL, which is associated with greater treatment intensity, increased imaging burden for staging and response assessment, and worse survival (Kahn & Beauchemin, 2021; Kahn et al., 2022; Ou et al., 2024). These disparities are driven by multilevel social determinants of health, including insurance instability, structural racism, language barriers, and limited access to timely primary and specialty care, all of which may delay diagnostic evaluation and imaging (Ou et al., 2024). Community-level factors, such as residence in historically redlined counties, racial residential segregation, and low Child Opportunity Index neighborhoods, have also been associated with later stage at diagnosis for pediatric HL, emphasizing that structural and environmental disadvantages influence when children enter the diagnostic imaging and treatment pathway (Ou et al., 2024). Although national incidence trends for pediatric HL have remained relatively stable, racial and ethnic differences in incidence and age-specific patterns persist, reinforcing the need for equity-focused diagnostic and staging strategies (Cheng et al., 2025; Mousavi et al., 2025).

Disparities continue beyond diagnosis and affect treatment response assessment, surveillance imaging, and long-term follow-up. Children and adolescents who are publicly insured, from low income households, or treated outside National Cancer Institute or Children's Oncology Group affiliated centers are less likely to receive guideline-concordant, risk-adapted care, including standardized imaging protocols that inform treatment modification and survivorship planning (Kahn & Beauchemin, 2021; Kahn et al., 2022). Importantly, studies show that racial and ethnic disparities in outcomes are substantially reduced when patients are treated on cooperative group clinical trials, highlighting the role of standardized imaging and treatment guidelines

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in mitigating inequity (Kahn & Beauchemin, 2021). However, disparities re-emerge in relapse management and survivorship, areas that rely heavily on longitudinal imaging to detect recurrence and late effects such as cardiopulmonary toxicity and secondary malignancies, where minority and socioeconomically disadvantaged survivors are less likely to receive guideline-recommended surveillance (Kahn & Beauchemin, 2021; Cheng et al., 2025). Timely access to diagnostic and response-adapted imaging, referral to specialized pediatric cancer centers when feasible, and consistent survivorship imaging across care settings are necessary to reduce avoidable variation and promote equitable outcomes for all children with pediatric HL.

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Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) (PEDONC-5.3)

ONCP.HL.0005.3.A
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Criteria

- Indications and coding for rare circumstances where PET/MRI may be approved are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**.

Indication	Medically Necessary Imaging Study
Initial staging for individuals with aggressive mature B-cell NHL	ANY or ALL of the following: • CT Neck with contrast (CPT® 70491) ◦ MRI Neck without and with contrast (CPT® 70543) in place of CT Neck, if requested • CT Chest with contrast (CPT® 71260) • CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) in place of CT Abdomen and Pelvis, if requested. ◦ Abdominal ultrasound (CPT® 76700 or 76705) at initial presentation if CT/MRI not available. • CT with contrast or MRI without and with contrast any other symptomatic body area • PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498 [may be approved in addition to diagnostic CTs])
Additional initial staging for individuals with aggressive mature B-cell NHL if symptoms or extent of disease suggest intracranial extension or metastasis	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Additional initial staging for individuals with aggressive mature B-cell NHL if symptoms or extent of disease suggest intraspinal extension or metastasis (back pain)	• MRI of whole spine without and with contrast if there is suspected leptomeningeal disease or if sedation will be required
Restaging for treatment response for individuals with aggressive mature B-cell NHL	• **ANY** of the following, as often as every cycle of chemotherapy (~every 3 weeks): ◦ CT with contrast or MRI without and with contrast (should be same modality as initial diagnosis if possible) of previously involved areas ◦ PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) until a negative PET is obtained ▪ Whole-body PET/CT (CPT® 78816) may be approved if there is clinical suspicion of, or known, skull or distal lower extremity involvement. ▪ PET/CT may be approved in conjunction with diagnostic CTs/MRIs, PET/CT should not replace imaging with contrast-enhanced diagnostic-quality CT or MRI.
Restaging for all subsequent treatment response, including end of therapy evaluation, after negative PET/CT (either Deauville or Lugano 1, 2 or 3 as reported in formal radiology interpretation) for individuals with aggressive mature B-cell NHL	• CT with contrast or MRI without and with contrast (should be same modality as initial diagnosis if possible) of previously involved areas, as often as every 2 cycles of chemotherapy, and at the end of therapy

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Indication	Medically Necessary Imaging Study
End of therapy PET with Deauville 4-5 avidity for individuals with aggressive mature B-cell NHL	ONCE, at least 6-8 weeks after end of therapy PET: • PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) OR • CT Neck, Chest, Abdomen, and Pelvis with contrast (CPT® 70491, CPT® 71260, CPT® 74177)
Assessment of disease activity in inconclusive residual masses seen on conventional imaging for individuals with aggressive mature B-cell NHL	• PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498)
Individuals with aggressive mature B-cell NHL being treated with Rituximab who present with abdominal pain, due to risk of bowel perforation and obstruction	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ US, x-ray, or other red flags are not required prior to CT
Surveillance of asymptomatic individuals with aggressive mature B-cell NHL with residual masses in the chest or abdomen and pelvis	• Chest x-ray and Abdominal (CPT® 76700) and Pelvic (CPT® 76856) ultrasound 3 months after completion of therapy. If stable, no further imaging. • In asymptomatic individuals without residual masses, surveillance imaging is not considered medically necessary.

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Indication	Medically Necessary Imaging Study
Clinical symptoms or laboratory findings suggesting recurrence for individuals with aggressive mature B-cell NHL	• MRI Brain without and with (CPT® 70553) for history of CNS involvement or new signs or symptoms suggesting intracranial disease In addition to the above imaging, **ANY** of the following: • CT Neck with contrast (CPT® 70491) **and** CT Chest with contrast (CPT® 71260) **and** CT Abdomen and Pelvis with contrast (CPT® 74177) **and** CT with contrast of other previously involved visceral areas or currently symptomatic areas (MRI with and without contrast in place of CT for all areas other than the chest if requested) **and** • PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498)
Suspected PTLD recurrence with documentation of new palpable nodes, rising LDH, or rising quantitative EBV PCR for individuals with aggressive mature B-cell NHL	• PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) • CT Neck with contrast (CPT® 70491) and CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177)

Background and Supporting Information

- Pediatric aggressive mature B-cell NHL includes Burkitt lymphoma/leukemia, diffuse large B-cell lymphoma, primary mediastinal large B cell lymphoma, post-transplant lymphoproliferative disorder, and viral associated lymphoproliferative disorders, all of which are addressed within a single imaging framework (NCCN, 2026).
- These malignancies are typically high grade and rapidly progressive, with frequent extranodal involvement of the abdomen, mediastinum, bone marrow, or central nervous system at presentation (Mhlanga et al., 2023).
- Staging is performed using the International Pediatric Non-Hodgkin Lymphoma Staging System, which emphasizes the presence of extranodal disease, bone marrow involvement, and CNS involvement (Mhlanga et al., 2023; NCCN, 2026).
- Initial management commonly includes a brief low intensity cytoreduction phase, followed by early treatment response assessment to determine subsequent therapy intensity (NCCN, 2026).

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Evidence Discussion

- Early response imaging performed during initial therapy is supported by pediatric treatment protocols, as it directly informs risk-adapted treatment escalation or de-escalation (NCCN, 2026).
- Due to the aggressive clinical behavior of these lymphomas, relapse most often presents with clear clinical symptoms, and routine asymptomatic surveillance imaging has not been shown to improve outcomes (Mhlanga et al., 2023).
- FDG-PET/CT is valuable for staging and response assessment when disease is FDG avid; however, its use in routine post-therapy surveillance is discouraged because of false positive findings and lack of outcome benefit (Mhlanga et al., 2023; NCCN, 2026).
- Imaging strategies focused on diagnosis, staging, and treatment response optimize disease control while limiting unnecessary radiation exposure in pediatric patients (NCCN, 2026).

Health Equity Considerations

Pediatric aggressive mature B-cell NHL, including Burkitt lymphoma and diffuse large B-cell lymphoma, are highly aggressive malignancies that require rapid diagnosis, comprehensive staging, and timely initiation of intensive, risk adapted therapy. Children frequently present with advanced disease involving extranodal sites such as the abdomen, bone marrow, or central nervous system, necessitating access to advanced imaging modalities, including cross-sectional imaging and functional imaging for accurate staging and response assessment (Jeon et al., 2022). Health equity challenges arise when timely access to specialized pediatric oncology services and advanced imaging is limited, as delays in diagnosis and staging may disproportionately affect children from underserved communities and contribute to higher disease burden at presentation. Because outcomes are closely linked to stage and risk group classification, inequities in early diagnostic pathways and imaging availability may translate into disparities in treatment intensity, toxicity exposure, and survival (Jeon et al., 2022).

Equity considerations extend beyond diagnosis to include treatment monitoring, toxicity surveillance, and long-term follow-up imaging. Intensive multi-agent chemotherapy regimens, such as LMB-based protocols and rituximab-containing therapies for high risk disease, are associated with substantial acute toxicities and risk of late effects, including secondary malignancies, underscoring the need for consistent imaging based surveillance across all patient populations (Jeon et al., 2022). Patients with advanced stage or high risk disease experience worse outcomes and higher rates of complications, highlighting the importance of standardized imaging guidelines to ensure uniform assessment of treatment response and complications regardless of care setting. Standardized staging, response evaluation, and survivorship imaging protocols are needed to reduce variability in care delivery, support early detection of treatment-related

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complications, and promote equitable outcomes for children with aggressive mature B-cell NHL across healthcare systems (Jeon et al., 2022).

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Anaplastic Large Cell Lymphoma (ALCL) (PEDONC-5.4)

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v1.0.2027

Criteria

- Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

Indication	Medically Necessary Imaging Study
Initial staging for individuals with ALCL	• ANY OR ALL of the following: ◦ CT Neck with contrast (CPT® 70491), CT Chest with contrast (CPT® 71260), and CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI without and with contrast of affected area ▪ Substituted for CT in cases of paraspinal or soft tissue extremity primary tumors ◦ CT with contrast or MRI without and with contrast any other symptomatic body area ◦ PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and 76498)
Additional initial staging for individuals with ALCL with bony primary tumors or metastatic disease	• Bone scan (See: **Modality General Considerations (PEDONC-1.3)**)
Restaging at the end of induction chemotherapy (commonly 4 to 6 weeks) for individuals with ALCL	• CT with contrast or MRI without and with contrast of previously involved areas (should be same modality as initial diagnosis if possible)

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Indication	Medically Necessary Imaging Study
Treatment response in individuals with ALCL treated with cytotoxic chemotherapy	• Every 2 cycles: ◦ CT of previously involved areas ▪ If CT is performed for primary treatment response, PET/CT (CPT® 78815 or CPT® 78816) to clarify inconclusive findings detected on conventional imaging OR ◦ PET/CT or PET/MRI (CPT® 78813 and CPT® 76498) until a negative PET is obtained ▪ If PET/CT (CPT® 78815 or CPT® 78816) is performed for primary treatment response, CT or MRI to clarify inconclusive findings detected on PET imaging
Restaging after negative PET/CT (either Deauville or Lugano 1, 2 or 3 as reported in formal radiology interpretation) for individuals with ALCL	• CT with contrast of previously involved areas
Surveillance for individuals with ALCL	• CT with contrast or MRI without and with contrast of all previously involved areas every 6 months for 2 years after completion of therapy.
Additional surveillance for individuals with ALCL with bony primary tumors or metastatic disease	• Bone scan (See: **Modality General Considerations (PEDONC-1.3)** for coding) at 3, 6, 12, and 18 months after therapy is completed
Clinical symptoms suggesting recurrence for individuals with ALCL	• CT Neck with contrast (CPT® 70491), CT Chest with contrast (CPT® 71260), CT Abdomen and Pelvis with contrast (CPT® 74177), and CT with contrast of other previously involved or currently symptomatic areas

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Indication	Medically Necessary Imaging Study
Clarify inconclusive findings on conventional imaging to evaluate the need for biopsy to establish recurrence for individuals with ALCL	• PET/CT (CPT® 78815 or CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498)

Background and Supporting Information

- ALCL is a distinct subtype of pediatric non-Hodgkin lymphoma and may have a clinical presentation similar to Hodgkin lymphoma until immunophenotypic and molecular studies establish the diagnosis (Mhlanga et al., 2023).
- ALCL frequently involves lymph nodes and has a higher incidence of extranodal disease, including skin, lung, bone, and soft tissues, compared with Hodgkin lymphoma (Mhlanga et al., 2023).
- Staging follows the International Pediatric Non-Hodgkin Lymphoma Staging System, consistent with other aggressive pediatric NHL subtypes (Mhlanga et al., 2023).
- Imaging is used to define disease extent and evaluate treatment response rather than to establish histologic diagnosis (Mhlanga et al., 2023).

Evidence Discussion

- FDG-PET/CT is effective for initial staging and response assessment in pediatric ALCL, as disease is typically FDG avid and metabolic response correlates with clinical outcomes (Mhlanga et al., 2023).
- Similar to other aggressive pediatric NHLs, routine surveillance imaging after completion of therapy has not demonstrated a survival benefit, as relapse is usually clinically apparent (Mhlanga et al., 2023).
- Restricting follow-up imaging to clinically indicated scenarios balances early detection of meaningful relapse with avoidance of unnecessary radiation exposure (NCCN, 2026).
- Imaging aligned with treatment milestones and symptom-driven evaluation supports appropriate disease monitoring without increasing false positive findings or unnecessary interventions (Mhlanga et al., 2023).

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Neuroblastoma (PEDONC-6)

Guideline

Neuroblastoma – General Considerations (PEDONC-6.1)
Staging and Risk Grouping – Neuroblastoma (PEDONC-6.2)
Neuroblastoma – Initial Staging (PEDONC-6.3)
Neuroblastoma – Treatment Response Imaging (Risk Group Dependent) (PEDONC-6.4)
Neuroblastoma – Surveillance Imaging (Risk Group Dependent) (PEDONC-6.5)
References (PEDONC-6)

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Neuroblastoma – General Considerations (PEDONC-6.1)

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Criteria

- PEDONC-6 should be used to review neuroblastoma, ganglioneuroblastoma, and ganglioneuroma in individuals of all ages, with the exception of esthesioneuroblastoma in individuals of all ages, which should be reviewed using **Squamous Cell Carcinomas of the Head and Neck (ONC-3)** in the Oncology Imaging Guidelines.
- Neuroblastoma is divided into very low, low, intermediate, and high-risk disease based on International Neuroblastoma Risk Group (INRG) Staging System (see: **Staging and Risk Grouping (PEDONC-6.2)**). The treatment approaches for each risk group vary widely and have distinct imaging strategies. The risk group for a given individual should be provided by the ordering provider in the clinical information provided for review.
- For metabolic imaging in individuals who are MIBG positive at diagnosis and then become MIBG negative in response to treatment:
  - Continue to use MIBG (see table below and **PEDONC-1.3** for coding)

Study Type	Coding
Bone scan	▪ **ANY** of the following codes are considered medically necessary: - CPT® 78300 - CPT® 78305 - CPT® 78306 - CPT® 78803, 78830, or 78832 • In addition to the above imaging, **ANY** of the following are considered medically necessary : ◦ CPT® 78305 ◦ CPT® 78306

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Study Type	Coding
^{123}I-metaiodobenzylguanidine (MIBG) scintigraphy	▪ **ONE** of the following codes is considered medically necessary: - CPT® 78801 - CPT® 78802 - CPT® 78804 ▪ In addition to the above imaging, **ONE** of the following is considered medically necessary: - CPT® 78803 - CPT® 78830 - CPT® 78831 - CPT® 78832 **OR** ▪ CPT® 78800 is considered medically necessary for KNOWN neuroblastoma when only a single-site follow up is desired but is not sufficient for the initial workup of suspected disease.
Octreotide scan	▪ Same coding as MIBG
Gallium scan	▪ Same coding as MIBG

- MIBG remains the standard of care metabolic imaging in neuroblastoma. 18F-FDG-PET-CT is not considered medically necessary unless one of the exceptions below is present. **All PET imaging in PEDONC-6 refers to 18F-FDG radiotracer.** All other radiotracers are considered not considered medically necessary at this time:

Indication	Medically Necessary Imaging Study
◦ Any of the following: ▪ individuals with MIBG-negativity documented at initial diagnosis ▪ individuals with discordant findings on MIBG and conventional imaging (i.e., it is suspected there is more active disease than is visible on MIBG) ▪ at major decision points (such as hematopoietic stem cell transplant or surgery), if MIBG and CT/MRI findings are inconclusive	◦ Whole-body 18F-FDG PET/CT (CPT® 78816) ◦ In scenarios where PET/CT is considered medically necessary, it does not preclude the other diagnostic imaging studies considered medically necessary throughout **PEDONC-6**. PET/CT is viewed as replacing MIBG in these scenarios. Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

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Indication	Medically Necessary Imaging Study
◦ Individuals currently receiving medications that may interfere with MIBG uptake that cannot be safely discontinued prior to imaging, including: ▪ tricyclic antidepressants (amitriptyline, imipramine, etc.) ▪ selective serotonin reuptake inhibitors (SSRI's, sertraline, paroxetine, escitolapram, etc.) ▪ neuroleptics (risperidone, haloperidol, etc.) ▪ antihypertensive drugs (alpha or beta blockers, calcium channel blockers) ▪ decongestants (phenylephrine, ephedrine, pseudoephedrine) ▪ stimulants (methylphenidate, dextroamphetamine, etc.)	◦ 18F-FDG PET/CT (CPT® 78816) is only considered medically necessary when specific documentation of the medication interaction is included with the current PET imaging request. ◦ Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

Background and Supporting Information

- Neuroblastoma is the most common extracranial solid tumor of childhood and arises from the developing sympathetic nervous system, most frequently from the adrenal gland or paraspinal sympathetic chain (NCCN, 2026).
- Neuroblastoma demonstrates marked biologic heterogeneity, ranging from tumors that spontaneously regress to aggressive metastatic disease requiring multimodality therapy (NCCN, 2026).
- The majority of neuroblastomas produce catecholamines, and elevated urinary homovanillic acid (HVA) and vanillylmandelic acid (VMA) are commonly identified at diagnosis and may assist in disease evaluation (NCCN, 2026).
- Imaging plays a central role in diagnosis, staging, surgical planning, treatment response assessment, and post-treatment surveillance for neuroblastoma (NCCN, 2026).

Evidence Discussion

- Cross-sectional imaging and functional nuclear imaging provide complementary information that is essential for accurate disease characterization and risk stratification (NCCN, 2026).

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- Technetium 99m bone scintigraphy has limited sensitivity for neuroblastoma skeletal metastases and does not provide added value when MIBG scintigraphy is available, supporting exclusion from routine evaluation (NCCN, 2026).
- Imaging strategies that limit unnecessary radiation exposure while preserving diagnostic accuracy are particularly important in pediatric populations with favorable long term survival (NCCN, 2026).

Health Equity Considerations

Neuroblastoma is marked by substantial inequities in incidence, stage at diagnosis, treatment delivery, and outcomes that reflect both global and U.S.-based disparities in socioeconomic resources, race and ethnicity, and access to specialized pediatric oncology care. Global burden analyses demonstrate that children in low and low middle sociodemographic index (SDI) regions experience disproportionate increases in incidence, mortality, and disability-adjusted life years (DALYs), largely driven by delayed diagnosis, limited access to advanced imaging, and constrained availability of risk-adapted multimodal therapy (Nong et al., 2025; Zhang et al., 2025). In contrast, high SDI regions have seen declining disease burden, attributable to earlier detection, widespread availability of diagnostic imaging, and integration of advanced therapies such as immunotherapy (Zhang et al., 2025). Within the United States, population-based studies consistently show that Black and Hispanic children are more likely to present with high-risk disease and advanced stage, which necessitates more intensive imaging for staging, response assessment, and surveillance, and is associated with worse survival (Campbell et al., 2025; Chennakesavalu et al., 2023). These disparities persist across eras of modern therapy and reflect the cumulative impact of structural racism, socioeconomic disadvantage, and inequitable access to high quality diagnostic pathways and imaging resources (Chennakesavalu et al., 2023; Umaretiya et al., 2025).

Disparities also extend into treatment monitoring, toxicity management, and survivorship, all of which rely heavily on longitudinal imaging. Even within highly standardized Children's Oncology Group (COG) clinical trials, Black and Hispanic children with high-risk neuroblastoma experience inferior overall survival compared with non-Hispanic White children, indicating that uniform treatment protocols alone do not eliminate inequity (Umaretiya et al., 2025). Evidence suggests that differential treatment-related toxicity and healthcare utilization contribute to these outcomes; for example, Hispanic children undergoing post-consolidation immunotherapy have markedly higher rates of ICU-level care, reflecting potentially preventable differences in supportive care and toxicity monitoring (Shoag et al., 2025). Socioeconomic disadvantage, including public insurance and neighborhood level poverty, further compounds these risks and may limit consistent access to surveillance imaging for relapse detection and late effect monitoring (Campbell et al., 2025; Shoag et al., 2025). Timely and equitable access to diagnostic and functional imaging, standardized response adapted and survivorship imaging across care settings, and coordination with supportive care resources are

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needed. Such an approach can help reduce avoidable variation in imaging utilization, support early identification of complications or relapse, and promote more equitable outcomes for children with neuroblastoma across diverse populations (Chennakesavalu et al., 2023; Umaretiyia et al., 2025).

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Staging and Risk Grouping – Neuroblastoma (PEDONC-6.2)

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Criteria

- Most recent treatment protocols are using the updated International Neuroblastoma Risk Group (INRG) staging system
  - L1: Localized tumor not involving vital structures as defined by the list of image-defined risk factors and confined to one body compartment
    - Image-defined risk factors include a list of specific imaging findings defining individuals less likely to be candidates for complete surgical resection
    - These risk factors involve the encasement of major blood vessels, airway, skull base, costovertebral junction, brachial plexus, spinal canal, or major organs or structures
  - L2: Locoregional tumor with presence of one or more image-defined risk factors
  - M: Distant metastatic disease (except stage MS)
  - MS: Metastatic disease in children younger than 18 months with metastases confined to skin, liver, and/or bone marrow with <10% involvement (MIBG must be negative in bone and bone marrow)
- The risk group for any given individual should be provided or documented by the requesting provider.

Background and Supporting Information

- Tumors are classified as L1, L2, M, or MS based on anatomic extent and the presence of image defined risk factors (IDRFs) that indicate local tumor invasiveness (NCCN, 2026).
- Risk stratification incorporates staging along with age, MYCN amplification status, histopathology, segmental chromosomal aberrations, and tumor ploidy to determine low, intermediate, or high-risk disease (NCCN, 2026).

Evidence Discussion

- Use of an imaging-based staging system improves consistency of disease classification and enables pretreatment surgical risk assessment (NCCN, 2026).
- Identification of IDRFs on imaging correlates with surgical complexity and informs treatment planning without delaying therapy initiation (NCCN, 2026).

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- Risk-adapted imaging recommendations support optimized outcomes while avoiding unnecessary diagnostic testing across distinct prognostic groups (NCCN, 2026).

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Neuroblastoma – Initial Staging (PEDONC-6.3)

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Criteria

The following imaging studies are considered medically necessary in the initial staging of individuals with neuroblastoma, ganglioneuroblastoma, or ganglioneuroma:

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with neuroblastoma, ganglioneuroblastoma, or ganglioneuroma	• ^{123}I-metaiodobenzylguanidine scintigraphy (see table in **Neuroblastoma – General Considerations (PEDONC-6.1)** for MIBG coding details) AND • ONE of the following sets of imaging: ◦ CT Neck with contrast (CPT® 70491), CT Chest with contrast (CPT® 71260), and CT Abdomen and Pelvis with contrast (CPT® 74177) OR • MRI Neck without and with contrast (CPT® 70543), MRI Chest without and with contrast (CPT® 71552), and MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
• All individuals with neuroblastoma, ganglioneuroblastoma, or ganglioneuroma with paraspinal tumors • Individuals with neuroblastoma, ganglioneuroblastoma, or ganglioneuroma with back pain or cord compression symptoms	In addition to the above imaging: • MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar (CPT® 72158) spine without and with contrast

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Indication	Medically Necessary Imaging Study
Evaluation of suspected adrenal neuroblastoma, ganglioneuroblastoma, or ganglioneuroma when CT or MRI is inconclusive for an adrenal lesion in individuals with neuroblastoma, ganglioneuroblastoma, or ganglioneuroma	• Adrenal nuclear imaging (CPT® 78075)
Clinical signs/symptoms suggest brain and/or orbital involvement in individuals with neuroblastoma, ganglioneuroblastoma, or ganglioneuroma	**ANY**of the following: • MRI Brain without and with contrast (CPT® 70553) • CT Head with contrast (CPT® 70470) • CT Orbits/Maxillofacial with contrast (CPT® 70487)
Pediatric Horner's syndrome with suspicion for neuroblastoma	ANY of the following: • MRI Brain without contrast or MRI Brain without and with contrast (CPT® 70551 or 70553) • MRI Orbits (CPT® 70543) or CT Neck with contrast (CPT® 70491) +/- CT Orbits/Temporal Bone with contrast (CPT® 70481) • MRI Chest without and with contrast (CPT® 71552) or CT Chest with contrast (CPT® 71260) If suspected spinal cord lesions, MRI Cervical Spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) If abdominal symptoms or elevated catecholemines (HVA and HMA), MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) For other etiologies of Horner's syndrome, see **Pupillary Abnormalities Including Horner's Syndrome (HD-32.2)**

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- PET should not be used unless one of the exceptions stated in section **Neuroblastoma – General Considerations (PEDONC-6.1)** is present.

Evidence Discussion

- Initial staging requires contrast-enhanced CT or MRI to evaluate the primary tumor, assess regional extension, and identify IDRFs (NCCN, 2026).
- I-123 metaiodobenzylguanidine (MIBG) scintigraphy, with SPECT or SPECT/CT when available, is the preferred modality for detecting metastatic disease due to high tumor avidity (NCCN, 2026).
- MIBG scintigraphy demonstrates high sensitivity and specificity for osseous and soft tissue metastases and is superior to conventional bone scintigraphy for neuroblastoma evaluation (NCCN, 2026).
- SPECT or SPECT/CT improves lesion localization and increases diagnostic confidence without requiring separate diagnostic CT imaging (NCCN, 2026).
- Delay of emergent therapy to complete imaging studies may be harmful in select cases, supporting timely but medically appropriate completion of staging evaluations (NCCN, 2026).

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Neuroblastoma – Treatment Response Imaging (Risk Group Dependent) (PEDONC-6.4)

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Criteria

- Risk Grouping will not be known at the time of initial staging, but is critical for all imaging decisions after initial staging is complete. **The treating oncologist should always know the individual's risk grouping**. It is not possible to establish the appropriate imaging plan for a neuroblastoma individual without knowing his/her risk group.

All Very Low Risk and Low Risk Neuroblastoma Not Receiving Chemotherapy:

Indication	Medically Necessary Imaging Study
All individuals with very low risk and low risk neuroblastoma not receiving chemotherapy, no sooner than 4 weeks after diagnosis to determine if additional treatment is necessary	• CT with contrast or MRI without and with contrast of the primary tumor site. If primary tumor site is abdomen or pelvis, imaging of both sites is considered medically necessary. ◦ Ultrasound is considered medically necessary if requested in place of CT or MRI to avoid radiation and/ or anesthesia exposure in low risk individuals

- Many individuals will be treated with surgical resection only without adjuvant therapy, and these individuals enter immediately into surveillance.

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All Intermediate Risk Neuroblastoma and Very Low Risk or Low Risk Neuroblastoma Receiving Chemotherapy:

Indication	Medically Necessary Imaging Study
Prior to surgical resection in individuals with intermediate risk neuroblastoma and individuals with very low risk or low risk neuroblastoma receiving chemotherapy	• Restaging imaging (MIBG and CT or MRI, as performed at initial diagnosis) • PET/CT or PET/MRI if exceptions noted in **PEDONC-6.1** are met. • Additional imaging for individuals with paraspinal disease: ◦ MRI without and with contrast of the whole spine (CPT® 72156, CPT® 72157, and CPT® 72158)
Treatment response, as often as every 2 cycles of chemotherapy (~every 6 weeks and at the end of planned treatment) in individuals with intermediate risk neuroblastoma and individuals with very low risk or low risk neuroblastoma receiving chemotherapy	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) OR • MRI Neck (CPT® 70543) without and with contrast, MRI Chest without and with contrast (CPT® 71552), and MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) AND • CT or MRI of other sites with prior measurable disease • Additional imaging for individuals with paraspinal disease: ◦ MRI without and with contrast of the whole spine (CPT® 72156, CPT® 72157, and CPT® 72158)
In addition to treatment response listed above, every 4 cycles, and at the end of planned chemotherapy treatment in individuals with intermediate risk neuroblastoma and individuals with very low risk or low risk neuroblastoma receiving chemotherapy	• MIBG scan (see table in **Neuroblastoma - General Considerations (PEDONC-6.1)** for MIBG coding details) • 18F-FDG PET/CT or PET/MRI if exceptions noted in **PEDONC-6.1** are met

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High-Risk Neuroblastoma:

Indication	Medically Necessary Imaging Study
• ANY of the following in individuals with high-risk neuroblastoma: ◦ Treatment response ▪ As often as every 2 cycles of chemotherapy, mAb, or biologic therapy (~every 6 weeks) ◦ Change in modality ▪ Prior to surgery, HSCT, XRT, or mAb therapy ◦ End of therapy	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) OR • MRI Neck (CPT® 70543) without and with contrast, MRI Chest without and with contrast (CPT® 71552), and MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) AND • CT or MRI of other sites with prior measurable disease • Additional imaging for individuals with paraspinal disease: ◦ MRI without and with contrast of the whole spine (CPT® 72156, CPT® 72157, and CPT® 72158) • MIBG scan (see table in **Neuroblastoma - General consideration (PEDONC-6.1)** for MIBG coding details)
At completion of ^{131}I-MIBG therapy in individuals with high-risk neuroblastoma	• ^{123}I-MIBG scan ◦ FDG-PET cannot be used after ^{131}I-MIBG therapy
Preoperative planning in individuals with high-risk neuroblastoma	• More frequent imaging with any of the above modalities can be approved around the time of surgery if needed

Background and Supporting Information

- Treatment response assessment is guided by the International Neuroblastoma Response Criteria (INRC), which combine anatomic and functional imaging parameters (NCCN, 2026).
- Response evaluation incorporates RECIST-based measurements for soft tissue disease and semiquantitative scoring of MIBG avid skeletal disease (NCCN, 2026).
- The timing and frequency of response imaging vary by risk group and treatment phase, particularly for high-risk neuroblastoma receiving multimodal therapy (NCCN, 2026).

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Evidence Discussion

- Functional imaging changes often precede anatomic tumor regression, supporting continued use of MIBG-based response assessment during therapy (NCCN, 2026).
- Standardized response criteria reduce interobserver variability and support consistent interpretation across clinical trials and treatment centers (NCCN, 2026).
- Avoidance of non-informative imaging modalities reduces cumulative radiation exposure without compromising assessment of treatment efficacy (NCCN, 2026).

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Neuroblastoma – Surveillance Imaging (Risk Group Dependent) (PEDONC-6.5)

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Criteria

Very Low Risk and Low Risk Neuroblastoma:

Indication	Medically Necessary Imaging Study
All individuals with very low risk and low risk neuroblastoma	• At 3, 6, 9, 12, 18, 24, 30 and 36 months after surgery: ◦ Ultrasound of involved areas OR • 3, 6, 9, 12, 18, 24, 30 and 36 months after surgery or to clarify unclear findings on ultrasound: ◦ CT with contrast or MRI without and with contrast of the primary tumor site
Clarification of findings on CT or MRI suspicious for disease recurrence in individuals with very low risk and low risk neuroblastoma	• MIBG (see table in **Neuroblastoma - General Considerations (PEDONC-6.1)** for MIBG coding details) • 18F-FDG PET/CT or PET/MRI if exceptions noted in **PEDONC-6.1** are met.

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Intermediate Risk Neuroblastoma:

Indication	Medically Necessary Imaging Study
All individuals with intermediate risk neuroblastoma	• Every 3 months for 1 year, then every 6 months for 1 year, and then at 36 months after surgery: ◦ CT with contrast or MRI without and with contrast of the primary tumor ▪ If the primary tumor is paraspinal: - MRI without and with contrast of the whole spine (CPT® 72156, CPT® 72157, and CPT® 72158) ◦ If primary site is abdomen or pelvis, both body sites are considered medically necessary (CPT® 74177 or the combination of CPT® 71297 and CPT® 74183) ◦ If negative at 36 months, ultrasound at 48 and 60 months after surgery to complete 5 years surveillance.
• BOTH of the following in individuals with intermediate risk neuroblastoma: ◦ Individuals with stage 4, or M disease, or 4S, or MS disease AND ◦ Positive MIBG at completion of therapy	• Until a negative scan is achieved, every 3 months in year 1, then once in year 2 and year 3: ◦ MIBG scan (see table in **Neuroblastoma – General Considerations (PEDONC-6.1)** for MIBG coding details) ◦ Once a negative MIBG is achieved, no further MIBG imaging is necessary. • MIBG is not considered medically necessary for all other intermediate risk individuals. • 18F-FDG PET/CT or PET/MRI if exceptions noted in **PEDONC-6.1** are met.

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High Risk Neuroblastoma:

Indication	Medically Necessary Imaging Study
All individuals with high-risk neuroblastoma	• Every 3 months for 1 year, then every 6 months for 1 year, and then annually to complete 6 years surveillance: ◦ CT with contrast or MRI without and with contrast of the primary tumor site AND ◦ MIBG scan (see table in **Neuroblastoma – General Considerations (PEDONC-6.1)** for MIBG coding details) ▪ 18F-FDG PET/CT or PET/MRI if exceptions noted in **PEDONC-6.1** are met ◦ If primary site is abdomen or pelvis, both body sites are considered medically necessary (CPT® 74177 or the combination of CPT® 71297 and CPT® 74183) ◦ For history of paraspinal disease, MRI without and with contrast of the whole spine (CPT® 72156, CPT® 72157, and CPT® 72158) ◦ If negative at 6 years, no further advanced imaging.
Suspected recurrence in individuals with high-risk neuroblastoma	• CT Chest/Abdomen/Pelvis with contrast (CPT® 71260 and CPT® 74177) or MRI Chest/Abdomen/Pelvis without and with contrast, (CPT® 71552, CPT® 74183, and CPT® 72197) and other sites of prior measurable disease or current symptoms • MRI Brain without and with contrast (CPT® 70553) for signs or symptoms of brain involvement • MRI without and with contrast of the whole spine (CPT® 72156, CPT® 72157, and CPT® 72158) for history of paraspinal disease, back pain, or cord compression symptoms. • MIBG scan (see table in **Neuroblastoma - General Considerations (PEDONC-6.1)** for MIBG coding details) • 18F-FDG PET/CT or PET/MRI if exceptions noted in **PEDONC-6.1** are met.

Background and Supporting Information

- Post-therapy surveillance imaging strategies are risk-adapted and tailored to disease biology, stage at diagnosis, and treatment intensity (NCCN, 2026).
- Low-risk individuals typically undergo limited imaging, often ultrasound or targeted cross-sectional imaging of the primary site (NCCN, 2026).

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- High-risk individuals require more intensive surveillance, including periodic MIBG or FDG PET imaging during the early post-treatment period (NCCN, 2026).

Evidence Discussion

- Risk stratified surveillance balances early detection of clinically significant relapse with minimization of radiation exposure and false positive findings (NCCN, 2026).
- Routine chest CT is not necessary in asymptomatic patients without prior thoracic involvement, supporting selective site directed imaging (NCCN, 2026).
- In high-risk neuroblastoma, early detection of recurrence using MIBG imaging has been associated with improved post-relapse outcomes, supporting continued use in this population (NCCN, 2026).

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Pediatric Renal Tumors (PEDONC-7)

Guideline

Pediatric Renal Tumors – General Considerations (PEDONC-7.1)
Unilateral Wilms Tumor (UWT) (PEDONC-7.2)
Bilateral Wilms Tumor (BWT) (PEDONC-7.3)
Pediatric Renal Cell Carcinoma (RCC) (PEDONC-7.4)
Clear Cell Sarcoma of the Kidney (CCSK) (PEDONC-7.5)
Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites (PEDONC-7.6)
Congenital Mesoblastic Nephroma (CMN) (PEDONC-7.7)
References (PEDONC-7)

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Pediatric Renal Tumors – General Considerations (PEDONC-7.1)

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Criteria

- Ultrasound is considered first-line imaging for suspected pediatric renal mass, given the lack of radiation exposure and need for sedation. Advanced imaging for suspected Wilms Tumor should be done after initial assessment with ultrasound, which has often been completed prior to diagnosis.
- A variety of tumors can occur in the pediatric kidney, and include the following:
  - Wilms Tumor
    - Favorable Histology (FHWT)
    - Focal Anaplasia (FAWT)
    - Diffuse Anaplasia (DAWT)
    - Bilateral Wilms Tumor (BWT)
  - Renal Cell Carcinoma (RCC)
  - Clear Cell Sarcoma of the Kidney (CCSK)
  - Malignant Rhabdoid Tumor of the Kidney (MRT)
  - Congenital Mesoblastic Nephroma (CMN)
  - Other cancers occurring in the kidney:
    - Neuroblastoma
    - Primitive Neuroectodermal Tumor
    - Rhabdomyosarcoma
    - Non-Rhabdomyosarcoma Soft Tissue Sarcomas
    - These and other rare tumors have been reported occurring primarily in the kidney and should be imaged according to the guidelines for the specific histologic diagnosis.
- For suspected renal tumor, cell type unknown, image according to **Pediatric Renal Cell Carcinoma (RCC) (PEDONC-7.4)**
- PET is not routinely considered medically necessary for initial staging, treatment response, or surveillance of any pediatric renal tumor - rare circumstances for exceptions are listed in the relevant guideline sections.

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Background and Supporting Information

- Pediatric renal tumors most commonly present as an asymptomatic abdominal mass and are initially evaluated with ultrasound due to the absence of ionizing radiation and high sensitivity for renal origin (NCCN, 2026).
- Cross-sectional imaging with contrast-enhanced CT or MRI is used to define tumor extent, assess contralateral kidney involvement, evaluate vascular invasion, and identify metastatic disease, most commonly to the lungs (NCCN, 2026).

Evidence Discussion

- Imaging strategies emphasizing ultrasound followed by targeted CT or MRI provide adequate staging information while minimizing radiation exposure in children, supporting guideline-directed modality selection (NCCN, 2026).
- PET imaging is not routinely considered medically necessary in the initial evaluation of pediatric renal tumors due to limited incremental diagnostic value over established anatomic imaging modalities (NCCN, 2026).
- Avoidance of unnecessary advanced imaging reduces cumulative radiation dose and procedural sedation risks without compromising oncologic outcomes (Mullen et al., 2018).

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Unilateral Wilms Tumor (UWT) (PEDONC-7.2)

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Criteria

Indication	Medically Necessary Imaging Study
Initial Staging for individuals with UWT	ONE of the following: • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) OR • CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ Doppler ultrasound to evaluate for tumor thrombus is not considered medically necessary unless CT findings are inconclusive AND • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ Should be completed prior to anesthesia exposure if possible • PET is not routinely considered medically necessary in the initial staging of any pediatric renal tumor
Bilateral renal lesions noted on ultrasound or CT for individuals with UWT	• MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast
Additional initial staging imaging for any individual with UWT with neurologic signs or symptoms raising suspicion of CNS metastases	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Additional initial staging imaging for any individual with UWT with signs or symptoms raising suspicion of bony metastases	• Bone scan (see: **PEDONC-1.3** for coding)
Treatment response ~every 2 cycles during treatment and at the end of planned therapy for individuals with UWT	• CT Chest with (CPT® 71260) *or* without contrast (CPT® 71250) • CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast
Rare circumstances to establish the presence of active disease only when a major therapeutic decision depends on PET avidity for individuals with UWT	• PET/CT (CPT® 78815)
Surveillance for individuals with UWT	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250), +/- chest x-ray AND CT Abdomen with contrast (CPT® 74160) or Abdominal US (CPT® 76700) ◦ Every 3 months for 2 years, then every 6 months for 2 additional years, to complete 4 years surveillance • In addition, pelvic imaging (CT or ultrasound) for individuals with stage II or higher disease, for individuals treated with nephrectomy only, or for individuals with a history of tumor rupture, known pelvic involvement, diffuse anaplastic histology, or a history of disease recurrence.
• There are no data to support the use of PET imaging for routine surveillance in any individual with Wilms tumor. • A very low risk subset of stage I FHWT will be observed after nephrectomy, and enter directly into surveillance.	

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Background and Supporting Information

- Most individuals with unilateral Wilms tumor present with an asymptomatic abdominal mass and undergo ultrasound as the initial diagnostic study (NCCN, 2026).
- Brain metastases are rare in Wilms tumor, occurring in approximately 0.5% of cases (NCCN, 2026).

Evidence Discussion

- Surveillance studies demonstrate that routine CT imaging does not improve overall survival after relapse compared with chest radiograph and abdominal ultrasound in favorable-histology unilateral Wilms tumor (Mullen et al., 2018).
- Elimination of CT from routine surveillance significantly reduces radiation exposure and cost without adversely affecting survival outcomes, supporting restricted imaging approaches (Mullen et al., 2018).
- Most recurrences are detected within the first two years after treatment, supporting time-limited and modality-selective surveillance strategies (Mullen et al., 2018; NCCN, 2026).

Health Equity Considerations

Children with unilateral Wilms tumor experience measurable disparities in incidence, treatment, and survival that are closely linked to social determinants of health (SDOH), including race, ethnicity, socioeconomic status (SES), and geography. Population-based analyses demonstrate higher incidence and lower survival among non-Hispanic Black children and those residing in non-metropolitan or socioeconomically disadvantaged counties, even in the context of modern, protocol-driven therapy (Espinoza et al., 2025; Chalfant et al., 2023). County- and neighborhood-level deprivation indices show a graded association with outcomes, with children from more deprived areas experiencing worse long-term overall survival compared with peers from less deprived areas, despite similar stage at presentation (Chalfant et al., 2023). These findings suggest that disparities are not explained solely by tumor biology but also by differences in access to care, resources supporting treatment adherence, and capacity for long-term surveillance.

Socioeconomic disadvantage has also been associated with differences in treatment delivery, including reduced likelihood of receiving recommended chemotherapy in lower-SES populations, which may contribute to observed survival gaps over time (Bhambhvani et al., 2022). Recent national database studies further demonstrate that higher neighborhood-level socioeconomic disadvantage independently predicts worse survival in Wilms tumor, even after adjusting for age, tumor size, bilateral or metastatic disease, and comorbidities, highlighting the cumulative impact of social risk factors on outcomes (Nofi et al., 2025). Structural barriers such as transportation challenges, insurance instability, distance from pediatric specialty centers, and reduced access to

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supportive services may delay diagnosis, complicate imaging follow-up, or limit timely detection of relapse. Awareness of these inequities is essential when applying imaging guidelines, as children from underserved communities may require additional care coordination and support to ensure equitable access to staging, surveillance imaging, and long-term follow-up (Espinoza et al., 2025; Nofi et al., 2025).

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Bilateral Wilms Tumor (BWT) (PEDONC-7.3)

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Criteria

Indication	Medically Necessary Imaging Study
Initial Staging for individuals with BWT	ONE of the following: • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) OR • CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) is often performed prior to discovery of bilateral lesions and should not prevent MRI from being approved if requested ▪ Doppler ultrasound to evaluate for tumor thrombus is not considered medically necessary unless CT findings are inconclusive AND • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ Should be completed prior to anesthesia exposure if possible • PET is not routinely considered medically necessary in the initial staging of any pediatric renal tumor
Additional initial staging imaging for any individual with BWT with neurologic signs or symptoms raising suspicion of CNS metastases	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Additional initial staging imaging for any individual with BWT with signs or symptoms raising suspicion of bony metastases	• Bone scan (see: **PEDONC-1.3** for coding)
Treatment response ~every 2 cycles during treatment and at the end of planned therapy for individuals with BWT	• MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) for individuals with a contraindication to MRI • CT Chest with (CPT® 71260) or without contrast (CPT® 71250)
Rare circumstances to establish the presence of active disease only when a major therapeutic decision depends on PET avidity for individuals with BWT	• PET/CT (CPT® 78815)

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Indication	Medically Necessary Imaging Study
Surveillance for individuals with BWT	• Every 3 months for 2 years, then every 6 months for 2 additional years, to complete 4 years surveillance: ◦ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) +/-chest x-ray AND ◦ CT Abdomen with contrast (CPT® 74160) or Abdominal US (CPT® 76700) • Pelvic imaging (CT or ultrasound) for individuals with stage II or higher disease, individuals treated with nephrectomy only, or individuals with a history of tumor rupture, diffuse anaplastic histology, known pelvic involvement, or a history of disease recurrence.
• PET is not routinely considered medically necessary to assess treatment response or for surveillance in Wilms tumor. • If treating with chemotherapy without a biopsy, disease evaluation is indicated at week 6. If either tumor has not shrunk 50%, then open biopsy is indicated to confirm favorable histology. • If partial nephrectomy still not feasible at week 6, the next disease evaluation is at week 12. Surgical resection should occur no later than week 12.	

Background and Supporting Information

- Individuals with bilateral Wilms tumor often present at a younger age and may initiate therapy without tissue diagnosis to preserve renal parenchyma and prevent disease upstaging (NCCN, 2026).
- Neoadjuvant chemotherapy is commonly used to reduce tumor burden prior to nephron-sparing surgical approaches (NCCN, 2026).
- Brain metastases remain rare in bilateral disease, similar to unilateral Wilms tumor (NCCN, 2026).

Evidence Discussion

- Risk-adapted imaging during neoadjuvant therapy allows assessment of tumor response and surgical feasibility while minimizing unnecessary repeat imaging (NCCN, 2026).
- Limiting surveillance imaging to clinically meaningful intervals reduces long-term radiation exposure in a population at elevated risk of chronic kidney disease and treatment-related morbidity (NCCN, 2026).

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Health Equity Considerations

Bilateral Wilms tumor represents a more complex clinical entity than unilateral disease and amplifies the impact of health inequities related to social determinants of health (SDOH). Although bilateral tumors account for a minority of Wilms tumor cases, they require prolonged, resource-intensive care, including specialized imaging for staging and treatment response, nephron-sparing surgical expertise, and long-term surveillance to preserve renal function. Population-based data demonstrate that children from socioeconomically disadvantaged or socially deprived communities experience worse overall survival in Wilms tumor, independent of tumor stage, suggesting that children with higher-risk and more complex presentations, such as bilateral disease, may be disproportionately affected by barriers to timely diagnosis, subspecialty referral, and longitudinal follow-up (Chalfant et al., 2023; Nofi et al., 2025). Racial and ethnic disparities persist as well, with non-Hispanic Black children experiencing higher incidence rates and lower survival compared with non-Hispanic White children, underscoring the intersection of biological risk and structural inequities in access to comprehensive oncology care (Espinoza et al., 2025).

Children with bilateral Wilms tumor are particularly vulnerable to inequities related to treatment delivery and imaging adherence, as optimal management often relies on serial imaging to guide preoperative chemotherapy, assess renal preservation strategies, and monitor for relapse. Socioeconomic disadvantage has been associated with reduced likelihood of receiving recommended chemotherapy in pediatric Wilms tumor populations, which may further exacerbate outcome disparities in bilateral disease, where protocol adherence is critical to balancing oncologic control and renal preservation (Bhambhvani et al., 2022). Geographic barriers, insurance instability, transportation limitations, and reduced access to pediatric centers with nephron-sparing surgical expertise may limit consistent imaging surveillance and coordinated multidisciplinary care. Incorporating health equity considerations into imaging guidelines for bilateral Wilms tumor is essential to support consistent staging and surveillance across populations and to recognize that children from underserved communities may require additional care coordination and support to ensure equitable access to imaging, treatment decision-making, and long-term follow-up (Espinoza et al., 2025; Nofi et al., 2025).

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Pediatric Renal Cell Carcinoma (RCC) (PEDONC-7.4)

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Criteria

- Individuals of any age with TFE3 or TFEB translocated RCC should be imaged according to this guideline section.
- Individuals with all other subtypes of RCC should be imaged according to **Renal Cell Cancer (RCC) (ONC-17)** in the Oncology Imaging Guidelines.

Indication	Medically Necessary Imaging Study
Initial Staging for individuals with RCC	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ If bilateral renal lesions are noted on ultrasound or CT, MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) are considered medically necessary • CT Chest with (CPT® 71260) *or* without contrast (CPT® 71250) ◦ Should be completed prior to anesthesia exposure if possible • PET scan is not routinely considered medically necessary in the initial staging of any pediatric renal tumor
Additional initial staging for any individual with RCC with neurologic signs or symptoms raising suspicion of CNS metastases	• MRI Brain without and with contrast (CPT® 70553)
Additional initial staging for any individual with RCC with signs or symptoms raising suspicion of bony metastases	• Bone scan (See: **PEDONC-1.3** for coding)

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Indication	Medically Necessary Imaging Study
Treatment response in individuals with RCC with residual measurable disease after initial surgery and receiving adjuvant medical therapy	• Every 2 cycles during active treatment: ◦ CT Chest with (CPT® 71260) *or* without contrast (CPT® 71250) and ◦ CT Abdomen with contrast (CPT® 74160) ▪ Pelvic imaging is not considered medically necessary unless prior pelvic involvement has been documented
Rare circumstances to establish the presence of active disease only when a major therapeutic decision depends on PET avidity for individuals with RCC	• PET/CT (CPT® 78815) • Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**
Surveillance in individuals with RCC with documented CNS metastases	• Every 6 months for 2 years after completion of all therapy: ◦ MRI Brain without and with contrast (CPT® 70553)
Surveillance in individuals with RCC with TFE3 or TFEB subtype	• Every 3 months for 2 years, then every 6 months for 2 years after completion of all therapy: ◦ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) ▪ Pelvic imaging is not considered medically necessary for surveillance unless prior pelvic involvement has been documented
Surveillance in all other histologies for individuals with RCC	• See: **Renal Cell Cancer (RCC) – Surveillance (ONC-17.4)**
New signs/symptoms suggestive of CNS recurrence for individuals with RCC	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
• PET is not routinely utilized to assess treatment response in pediatric RCC. • Other staging imaging than what is stated in the above table should be deferred until a histologic diagnosis is made, by complete nephrectomy for most unilateral renal tumors and biopsy for bilateral renal tumors or inoperable unilateral tumors.	

Background and Supporting Information

- Pediatric RCC is biologically distinct from adult RCC, with the majority of cases involving TFE3 or TFEB translocations, while 40%–45% demonstrate adult-type histologies (Geller et al., 2020).
- Most patients undergo complete surgical resection at diagnosis and enter surveillance without adjuvant therapy when disease is localized (Geller et al., 2020).

Evidence Discussion

- Doppler ultrasound for tumor thrombus evaluation is not routinely considered medically necessary when CT adequately assesses venous involvement (NCCN, 2026).
- Prospective COG data demonstrate excellent outcomes for completely resected pediatric RCC, including node-positive disease, supporting surveillance-based follow-up without routine adjuvant imaging escalation (Geller et al., 2020).
- Imaging decisions similar to adult RCC guidelines are appropriate only for pediatric cases with adult-type histology, supporting histology-driven imaging strategies (Geller et al., 2020).
- Limiting surveillance to clinically indicated imaging avoids unnecessary radiation exposure in a population with favorable long-term survival (Geller et al., 2020).

Health Equity Considerations

Pediatric RCC is a rare but aggressive malignancy that demonstrates pronounced health inequities related to race, socioeconomic conditions, and geographic context. Population-based and state-level analyses show that Black children are disproportionately affected by advanced-stage presentation and markedly worse survival compared with White children, particularly for non-Wilms renal tumors such as RCC (Neuzil et al., 2020; Holmes et al., 2024). National SEER data indicate that Black children with RCC experience a two- to four-fold higher risk of mortality than their White peers, even after adjustment for age, sex, insurance status, and selected socioeconomic variables, highlighting the persistent influence of structural and environmental inequities on outcomes (Holmes et al., 2024). These disparities are compounded by the fact that RCC often presents in adolescence, when symptoms may be nonspecific and

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access to timely diagnostic imaging and subspecialty evaluation may be uneven across populations and care settings (Neuzil et al., 2020).

Geographic and environmental factors further modify inequities in RCC outcomes. Children residing in urban or non-metropolitan areas, as opposed to metropolitan regions with access to high-volume pediatric oncology centers, demonstrate worse survival, and this effect is most pronounced among Black children, suggesting an interaction between race and place of residence (Holmes et al., 2024). Importantly, evidence from comprehensive pediatric cancer centers indicates that racial survival disparities for pediatric renal tumors, including RCC, may be attenuated when children receive standardized, multidisciplinary care with consistent access to advanced imaging, surgery, and long-term follow-up (Neuzil et al., 2020). Imaging guidelines for pediatric RCC should therefore be applied with awareness that children from historically underserved communities may face barriers to timely diagnostic and surveillance imaging. Proactive care coordination and attention to social risk factors are essential to promote equitable staging, treatment planning, and outcome assessment for pediatric patients with RCC (Holmes et al., 2024; Neuzil et al., 2020).

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Clear Cell Sarcoma of the Kidney (CCSK) (PEDONC-7.5)

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Criteria

Be careful not to confuse the diagnosis with clear cell RCC. See: Renal Cell Cancer (RCC) (ONC-17) for imaging guidelines.

Indication	Medically Necessary Imaging Study
Initial Staging for individuals with CCSK	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ Doppler ultrasound to evaluate for tumor thrombus is not considered medically necessary unless CT findings are inconclusive • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ Should be completed prior to anesthesia exposure if possible • Bone scan (see: **PEDONC-1.3** for coding) • MRI Brain without and with contrast (CPT® 70553) • PET is not routinely considered medically necessary in the initial staging of any pediatric renal tumor
Bilateral renal lesions are noted on ultrasound or CT in initial staging for individuals with CCSK	• MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)

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Indication	Medically Necessary Imaging Study
Treatment response ~every 2 cycles during treatment and at the end of planned therapy for individuals with CCSK	• CT Chest with (CPT® 71260) *or* without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) • Additionally, for individuals with CNS metastases at initial staging: ◦ MRI Brain without and with contrast (CPT® 70553) Bone scan (see: **Modality General Considerations (PEDONC-1.3)** for coding) at the end of planned therapy
Rare circumstances to establish the presence of active disease only when a major therapeutic decision depends on PET avidity for individuals with CCSK	• PET/CT (CPT® 78815) • Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**
Surveillance for individuals with CCSK	• Every 3 months for 2 years after completion of all therapy: ◦ CT Chest with (CPT® 71260) *or* without contrast (CPT® 71250) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) • Every 6 months for 3 years after completion of all therapy: ◦ MRI Brain without and with contrast (CPT® 70553) • Every 3 months for 1 year, then every 6 months for 2 years after completion of all therapy: ◦ Bone scan (see: **Modality General Considerations (PEDONC-1.3)** for coding) ◦ If negative at 36 months, no further advanced imaging. • Other surveillance imaging should be by Abdominal US (CPT® 76700) and chest x-ray

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- Other staging imaging should be deferred until a histologic diagnosis is made, by complete nephrectomy for most unilateral renal tumors and biopsy for bilateral renal tumors or inoperable unilateral tumors.

Background and Supporting Information

- CCSK typically presents as an asymptomatic abdominal mass and is initially evaluated with ultrasound, followed by cross-sectional imaging (NCCN, 2026).

Evidence Discussion

- CCSK demonstrates a higher propensity for osseous metastases than Wilms tumor, necessitating targeted staging imaging rather than generalized surveillance (NCCN, 2026).
- Imaging approaches focused on staging and treatment response assessment support early detection of clinically significant disease while limiting excessive surveillance imaging (NCCN, 2026).

Health Equity Considerations

CCSK is a rare pediatric renal malignancy that disproportionately affects very young children, particularly boys under the age of four, and often presents with aggressive clinical features that necessitate timely diagnosis and specialized care (Gao et al., 2021). Although population-based data suggest that the overall incidence of CCSK is low and relatively stable over time, its rarity poses inherent equity challenges, as children from underserved communities may experience delays in diagnosis due to limited access to advanced imaging, pediatric oncology expertise, and subspecialty pathology services required for accurate tumor identification. CCSK is frequently misdiagnosed as Wilms tumor without access to molecular or immunohistochemical confirmation, which can delay appropriate therapy and adversely affect outcomes, particularly in settings with fewer diagnostic resources (Gao et al., 2021).

While contemporary multimodal treatment has substantially improved survival for children with CCSK, outcomes remain inferior to Wilms tumor when comparisons are adjusted for disease characteristics, underscoring the aggressive nature of CCSK and the importance of consistent, protocol-driven care (Gao et al., 2021). Survival disparities may emerge when children lack access to comprehensive pediatric cancer centers capable of delivering intensive chemotherapy, specialized surgical management, and longitudinal surveillance imaging. In addition, CCSK has a predilection for hematogenous spread, particularly to bone and, at relapse, the brain, which increases reliance on high-quality staging and follow-up imaging that may be less accessible to populations facing socioeconomic or geographic barriers (Gao et al., 2021). Incorporation of health equity considerations is essential to support early detection of metastatic disease and recurrence and to ensure that children with CCSK receive

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equitable access to staging, surveillance, and survivorship care regardless of social or environmental context.

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Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites (PEDONC-7.6)

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Criteria

- Be careful not to confuse the diagnosis with rhabdomyosarcoma. See: **Rhabdomyosarcoma (RMS) (PEDONC-8.2)** for Imaging Guidelines
- Primary CNS rhabdoid malignancies should be imaged according to **Atypical Teratoid/Rhabdoid Tumors (ATRT) PEDONC-4.5)**
- MRT is a highly aggressive histologic variant that can also occur in other locations and all non-CNS sites should follow these guidelines.

Indication	Medically Necessary Imaging Study
Initial Staging for individuals with MRT of the kidney and other extracranial sites	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ Doppler ultrasound to evaluate for tumor thrombus is not considered medically necessary unless CT findings are inconclusive • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ Should be completed prior to anesthesia exposure if possible • Bone scan (see: **PEDONC-1.3** for coding) • MRI Brain without and with contrast (CPT® 70553) • PET is not routinely considered medically necessary in the initial staging of any pediatric renal tumor
Bilateral renal lesions are noted on ultrasound or CT in initial staging for individuals with MRT of the kidney and other extracranial sites	• MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)

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Indication	Medically Necessary Imaging Study
Treatment response ~every 2 cycles during treatment and at the end of planned therapy for individuals with MRT of the kidney and other extracranial sites	• CT Chest with (CPT® 71260) *or* CT Chest without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) ◦ If primary site other than kidney, perform CT with contrast or MRI without and with contrast of primary site in place of abdominal and pelvic imaging • MRI Brain without and with contrast (CPT® 70553): ◦ Every 2 cycles during treatment for individuals with CNS metastases at initial staging ◦ At the end of planned therapy for all individuals • Bone scan (see: **PEDONC-1.3** for coding) at the end of planned therapy only if positive at initial diagnosis
Rare circumstances to establish the presence of active disease only when a major therapeutic decision depends on PET avidity for individuals with MRT of the kidney and other extracranial sites	• PET/CT (CPT® 78815) • Indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

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Indication	Medically Necessary Imaging Study
Surveillance for individuals with MRT of the kidney and other extracranial sites	• Every 3 months for 2 years after completion of all therapy: ◦ CT Chest with (CPT® 71260) *or* without contrast (CPT® 71250) • Every 3 months for 3 years after completion of all therapy: ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) ▪ If primary site other than kidney, perform CT with contrast or MRI without and with contrast of primary site in place of abdominal imaging • Every 3 months for 1 year, then every 6 months for 1 year after completion of all therapy: ◦ MRI Brain without and with contrast (CPT® 70553) • If bone scan positive at initial diagnosis: ◦ Every 3 months for 1 year, then every 6 months for 2 years: ▪ Bone scan (see: **PEDONC-1.3** for coding) ◦ If negative at 36 months, no further advanced imaging • The role of surveillance imaging beyond these timeframes in unclear. Abdominal US (CPT® 76700) and chest x-ray may be considered.
Continued surveillance of individuals with rhabdoid tumor predisposition syndrome	• See: **Rhabdoid Tumor Predisposition Syndrome (PEDONC-2.11)**

- Other staging imaging should be deferred until a histologic diagnosis is made, by complete nephrectomy for most unilateral renal tumors and biopsy for bilateral renal tumors or inoperable unilateral tumors

Background and Supporting Information

- Malignant rhabdoid tumors are rare, aggressive malignancies that may present as renal or extrarenal masses, often identified on ultrasound during evaluation of abdominal distension (NCCN, 2026).

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Evidence Discussion

- Given the aggressive biology and early dissemination associated with MRT, imaging is primarily directed toward accurate staging and response assessment rather than prolonged surveillance (NCCN, 2026).
- Avoidance of routine PET imaging is supported by limited evidence of benefit over standard anatomic imaging modalities in pediatric renal tumors (NCCN, 2026).

Health Equity Considerations

MRT of the kidney and other extracranial sites represent some of the most aggressive pediatric malignancies and are diagnosed predominantly in infancy and early childhood. Population-based data demonstrate that MRTs disproportionately affect very young children, often within the first year of life, and are frequently associated with perinatal risk factors such as low birth weight, preterm delivery, and multiple gestation pregnancies (Heck et al., 2014). These associations suggest that structural and biologic vulnerabilities beginning in the prenatal and perinatal periods may intersect with social determinants of health, including access to high quality prenatal care and neonatal services. Given the rapid progression and poor prognosis of MRTs, delays in diagnosis or referral, more likely in resource limited or underserved settings, may exacerbate already poor outcomes for affected children (Heck et al., 2014).

Health inequities may also arise from variability in access to specialized pediatric oncology centers capable of providing timely diagnostic imaging, molecular testing for SMARCB1 loss, and intensive multimodal therapy. Outcomes for extracranial MRT remain poor globally, with survival strongly associated with younger age at diagnosis and advanced stage, both of which necessitate early and comprehensive staging and surveillance imaging (Shan et al., 2021). Differences in treatment completion rates, availability of standardized protocols, and access to advanced therapies such as radiation or investigational targeted agents may further contribute to outcome disparities, particularly in low resource or geographically isolated settings (Shan et al., 2021). Providers should emphasize the need for prompt, comprehensive imaging across disease sites and ongoing surveillance to support timely intervention and reduce disparities in survival for this highly vulnerable pediatric population (Heck et al., 2014; Shan et al., 2021).

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Congenital Mesoblastic Nephroma (CMN) (PEDONC-7.7)

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Criteria

Initial Staging

Indication	Medically Necessary Imaging Study
All individuals with CMN	CT Abdomen and Pelvis with contrast (CPT® 74177)
Inconclusive findings on chest x-ray in individuals with CMN	CT Chest with contrast (CPT® 71260)

Treatment Response

Indication	Medically Necessary Imaging Study
Individuals with CMN receiving preoperative chemotherapy every 2 cycles of therapy until surgery	CT Abdomen and Pelvis with contrast (CPT® 74177)
Baseline imaging following resection in individuals with CMN	CT Abdomen and Pelvis with contrast (CPT® 74177)
Individuals with a complete resection (i.e., no residual disease on post-resection imaging)	See: Surveillance Imaging

Surveillance Imaging

Indication	Medically Necessary Imaging Study
All individuals with CMN	Abdominal ultrasound (CPT® 76700) is the preferred surveillance imaging modality to avoid radiation and anesthesia exposures

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Indication	Medically Necessary Imaging Study
Individuals with CMN with residual abnormalities present on post-operative imaging or inconclusive findings on ultrasound	CT Abdomen and Pelvis with contrast (CPT® 74177) **or** MRI Abdomen and Pelvis without and with contrast (CPT® 74183 or 72197) every 3 months for 1 year after completion of all therapy

Background and Supporting Information

- CMN is the most common renal tumor in neonates and young infants and frequently presents at birth or on prenatal ultrasound (NCCN, 2026).
- Complete surgical resection is curative in most cases, and bilateral disease or histologically confirmed metastatic disease has not been reported (NCCN, 2026).

Evidence Discussion

- Recurrence after complete resection is rare, with most events occurring within the first year following diagnosis, supporting limited surveillance imaging (NCCN, 2026).
- Restricting follow-up imaging to symptom-directed evaluation minimizes radiation exposure in infants while maintaining excellent oncologic outcomes (NCCN, 2026).

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Pediatric Soft Tissue Sarcomas (PEDONC-8)

Guideline

Pediatric Soft Tissue Sarcomas – General Considerations (PEDONC-8.1)
Rhabdomyosarcoma (RMS) (PEDONC-8.2)
Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS) (PEDONC-8.3)
References (PEDONC-8)

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Pediatric Soft Tissue Sarcomas – General Considerations (PEDONC-8.1)

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Criteria

- Unless specified below, individuals under 18 years of age should be imaged according to this guideline section. Exceptions include:
  - Rhabdomyosarcoma in individuals (except uterine rhabdomyosarcoma) of all ages should be imaged according to guidelines in **Rhabdomyosarcoma (RMS) (PEDONC-8.2)**
  - Uterine rhabdomyosarcoma in individuals of all ages should be imaged according to guidelines in Uterine Cancer (ONC-22). See: **Uterine Cancer - General Considerations (ONC-22.0)** in the Oncology Imaging Guidelines
  - Kaposi's sarcoma in individuals of all ages should be imaged according to guidelines in **Kaposi's Sarcoma (ONC-31.10)** in the Oncology Imaging Guidelines
- Evaluation of soft tissue masses of uncertain nature prior to biopsy should follow general imaging guidelines:
  - Individuals 0 to 17 years of age, see: **Soft Tissue and Bone Masses (PEDMS-3)** in the Pediatric Musculoskeletal Imaging Guidelines
  - Individuals 18 years of age or older, see: **Bone Lesion (MS-10.2)** in the Musculoskeletal Imaging Guidelines
- Where there are indications for PET/CT in these guidelines, note that indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

Background and Supporting Information

- Pediatric soft tissue sarcomas are a heterogeneous group of malignant mesenchymal tumors that differ from adult soft tissue sarcomas in histologic distribution, biologic behavior, metastatic patterns, and treatment approaches (Acord et al., 2023; NCCN, 2026).
- Rhabdomyosarcoma (RMS) represents the most common pediatric soft tissue sarcoma, while non-rhabdomyosarcoma soft tissue sarcomas (NRSTS) comprise a diverse group of less common histologies (Acord et al., 2023).
- The lungs are the most common site of metastatic disease across pediatric soft tissue sarcomas, supporting routine chest imaging for initial staging and surveillance (Expert Panel on Musculoskeletal Imaging, 2022; NCCN, 2026).

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Evidence Discussion

- Imaging is central to diagnosis, staging, treatment planning, and surveillance, with modality selection dependent on tumor location, histology, and risk of metastatic disease (Acord et al., 2023; Expert Panel on Musculoskeletal Imaging, 2022).
- MRI with and without contrast is the preferred modality for local evaluation of most pediatric soft tissue sarcomas due to superior soft-tissue contrast and lack of ionizing radiation (Acord et al., 2023; Expert Panel on Musculoskeletal Imaging, 2022).
- Use of MRI for primary tumor evaluation improves assessment of local tumor extent, neurovascular involvement, and surgical planning while minimizing radiation exposure in children (Acord et al., 2023).
- Chest CT has greater sensitivity than chest radiography for detection of pulmonary metastases and directly impacts staging and treatment decisions in pediatric sarcoma (Expert Panel on Musculoskeletal Imaging, 2022).
- Routine use of extensive whole-body or abdominal CT imaging in asymptomatic children with soft tissue sarcoma has not demonstrated improved outcomes and increases cumulative radiation exposure (Acord et al., 2023; Expert Panel on Musculoskeletal Imaging, 2022).
- Restricting advanced imaging to scenarios with higher diagnostic yield balances early detection of clinically relevant disease with reduction of unnecessary radiation, false positives, and downstream interventions (Expert Panel on Musculoskeletal Imaging, 2022).

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Rhabdomyosarcoma (RMS) (PEDONC-8.2)

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Criteria

- Individuals of all ages are imaged according to this guideline, with exception of uterine rhabdomyosarcoma, which is imaged according to Uterine Cancer (ONC-22). See: **Uterine Cancer – General Considerations (ONC-22.0)** in the Oncology Imaging Guidelines.

Indication	Medically Necessary Imaging Study
Initial staging for all individuals with RMS	ALL of the following: • MRI without and with contrast of primary site ◦ CT with contrast if MRI is contraindicated • CT Chest with contrast or CT Chest without contrast ◦ should be completed prior to anesthesia exposure if possible • Whole-Body PET/CT (CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) ◦ Bone scan substituted for PET, if PET not available
Additional initial staging for individuals with RMS with ANY of the following: • evaluation of inconclusive PET findings in the abdomen or pelvis • primary site of abdomen or pelvis • lower extremity primary site	• CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
Additional initial staging for individuals with RMS with ANY of the following: • Primary site involving the paraspinal or paravertebral region • PET or bone scan-avid lesions in skull, neck, vertebrae • Neurologic signs or symptoms raising suspicion of CNS metastases	ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Treatment response, every 2 cycles during treatment, prior to local control surgery, and at the end of planned therapy in individuals with RMS	ALL of the following: • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • MRI without and with contrast of primary site ◦ CT if used at initial imaging for MRI contraindication • CT with contrast or MRI without and with contrast of all known metastatic sites using the same conventional imaging modality as per initial staging

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with RMS: • Response assessment prior to local control surgery or radiation therapy • Evaluation of residual mass visible on conventional imaging as part of end of therapy evaluation • Response assessment of disease visible on PET but not conventional imaging • PET results are likely to result in a treatment change for the individual, including a change from active treatment to surveillance.	• Whole-body PET/CT (CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498) ◦ Once PET has been documented to be negative for a given individual's cancer or all PET-avid disease has been surgically resected, PET is not considered medically necessary for continued disease monitoring or surveillance unless one of the exceptions in section **General Guidelines (PEDONC-1.0)** applies.
Restaging following local control surgery in individuals with RMS	ALL of the following: • MRI without and with contrast of primary site ◦ CT if used at initial imaging for MRI contraindication • CT with contrast or MRI without and with contrast of all known metastatic sites using the same conventional imaging modality as per initial staging
Surveillance, in individuals with RMS	ALL of the following, every 3 months for 3 years, then every 6 months in years 4-5, then annually: • MRI without or without and with contrast of primary tumor site ◦ CT if MRI contraindicated • Chest x-ray ◦ CT Chest with (CPT® 71260) **or** CT Chest without contrast (CPT® 71250) for new or worsening clinical symptoms of chest disease or new findings on chest x-ray

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Indication	Medically Necessary Imaging Study
Suspected recurrence in individuals with RMS	• Repeat conventional imaging as per initial staging for all individuals
ONE of the following in individuals with RMS: • Biopsy-proven recurrence • Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive or suspicious for recurrence, and PET avidity will determine whether biopsy or continued observation is appropriate • Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence, and PET would replace conventional imaging modalities.	• Whole-body PET/CT (CPT® 78816) or PET/MRI (CPT® 78813 and CPT® 76498)

Background and Supporting Information

- RMS accounts for approximately 60% of pediatric soft tissue sarcomas and demonstrates distinct embryonal and alveolar subtypes with differing metastatic behavior and risk stratification (Acord et al., 2023).
- RMS can arise from skeletal muscle precursors anywhere in the body, resulting in wide variability in presenting symptoms and primary tumor locations (Acord et al., 2023; NCCN, 2026).

Evidence Discussion

- MRI without and with contrast is preferred for primary site imaging in most anatomic locations, including the head and neck, extremities, pelvis, and chest wall (Acord et al., 2023).
- CT with contrast is preferred for RMS arising within the thoracic cavity (excluding the chest wall) due to the need for detailed evaluation of intrathoracic structures (Acord et al., 2023).
- FDG-PET imaging is used in initial staging to evaluate nodal and osseous metastatic disease, which may be occult on conventional imaging (Acord et al., 2023; NCCN, 2026).

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- FDG-PET imaging demonstrates higher sensitivity for detection of nodal and skeletal metastases in pediatric RMS compared with conventional staging methods and can alter initial staging and management (Acord et al., 2023).
- PET imaging has not shown consistent benefit for assessing treatment response in RMS, as changes in metabolic activity do not reliably correlate with prognosis or outcome (Acord et al., 2023).
- Persistent FDG uptake in residual masses at the end of therapy is common and does not necessarily indicate viable tumor, limiting the value of PET for routine surveillance (Acord et al., 2023).
- Avoidance of routine CT Abdomen and Pelvis imaging in initial RMS staging is supported by low incidence of clinically relevant abdominal metastases and helps reduce unnecessary radiation exposure (Acord et al., 2023).
- Restricting PET use during treatment and surveillance reduces false-positive findings, radiation exposure, and downstream testing without compromising detection of clinically meaningful recurrence (Acord et al., 2023).

Health Equity Considerations

RMS is the most common soft tissue sarcoma of childhood and adolescence, with incidence and outcomes influenced by biologic, sociodemographic, and health system factors. Population-based analyses demonstrate that while overall RMS incidence is relatively consistent across racial and ethnic groups, important disparities emerge in disease presentation and survival. National registry data show that non-Hispanic Black children have significantly worse survival compared with non Hispanic White children, even after adjustment for age, stage, histology, and socioeconomic status, suggesting that inequities in access to timely diagnosis, comprehensive staging, and high quality treatment may contribute to outcome differences (McEvoy et al., 2023). These findings contrast with results from Children's Oncology Group clinical trial cohorts, where non-Hispanic Black and Hispanic patients often present with higher risk features but experience comparable survival when treated on standardized protocols, underscoring the potential equity enhancing effect of protocol driven care (Munnikhuysen et al., 2023).

Disparities in RMS outcomes may also reflect differences in early recognition, diagnostic imaging access, and referral patterns. Higher risk features at presentation, including invasive tumors, alveolar histology, and metastatic disease, are more common among Hispanic and non-Hispanic Black patients, raising concern for delays in diagnosis that may be influenced by structural barriers, limited access to pediatric subspecialists, or implicit bias within health systems (Munnikhuysen et al., 2023). Socioeconomic factors further intersect with race and geography; population-based studies demonstrate trends toward poorer survival among children living in lower income counties, highlighting the importance of equitable access to imaging, multidisciplinary evaluation, and longitudinal surveillance regardless of insurance status or community resources (McEvoy et al., 2023).

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Broader epidemiologic and etiologic data also emphasize that RMS disproportionately affects very young children and may be influenced by prenatal, perinatal, and early life factors. Associations with birth characteristics, parental exposures, and genetic cancer predisposition syndromes suggest that underlying vulnerability may be compounded in populations facing disparities in prenatal care, environmental exposures, and access to genetic evaluation (Martin Giacalone et al., 2021). Explicit attention should be paid to health equity, promoting consistent staging, response assessment, and follow-up imaging across care settings. Ensuring timely, guideline-concordant imaging for all children with suspected or confirmed RMS may help reduce disparities in stage at diagnosis and outcomes, particularly for patients from historically underserved or underrepresented populations (Martin Giacalone et al., 2021; McEvoy et al., 2023; Munnikhuysen et al., 2023).

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Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS) (PEDONC-8.3)

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Criteria

Indication	Medically Necessary Imaging Study
Initial staging of all individuals with NRSTS	ALL of the following: • MRI without and with contrast of primary site ◦ CT with contrast if contraindication to MRI • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) ◦ Should be completed prior to anesthesia if possible • For primary tumor of the chest wall, both MRI Chest wall without and with contrast (CPT® 71552) and CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) to assess for pulmonary metastatic disease (indicated simultaneously) • PET/CT (CPT® 78815) ◦ Whole-body PET/CT (CPT® 78816) if there is clinical suspicion of skull or distal lower extremity involvement • Nuclear bone scan (see: **PEDONC-1.3** for coding) if PET is not available

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with NRSTS: • Additional initial staging for individuals with disease in the abdomen, pelvis, or lower extremities • Angiosarcoma, alveolar soft part sarcoma, clear cell sarcoma, epithelioid sarcoma, hemangiopericytoma, leiomyosarcoma, liposarcoma, retroperitoneal or intra-abdominal primary site (including pelvic primary site), other histologies documented to have propensity for lymphatic spread and deep-seated tumors • Inconclusive findings in the abdomen or pelvis on PET/CT	In addition to the above, one of the following combinations: • CT Abdomen and Pelvis with contrast (CPT® 74177) if not already performed • MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast • MRI Abdomen (CPT® 74183) with and without contrast and CT Pelvis (CPT® 72193) with contrast • CT Abdomen (CPT® 74160) with contrast and MRI Pelvis (CPT® 72197) without and with contrast
Further evaluation of ANY of the following in individuals with NRSTS: • PET or nuclear bone scan-avid lesions in skull, neck, or vertebrae seen on initial imaging • Neurologic signs or symptoms raising suspicion of CNS metastases • Myxoid round cell liposarcoma, angiosarcoma, alveolar soft part sarcoma, cardiac sarcoma • Additional staging for individuals with primary site arising in the paraspinal or paravertebral region	ALL of the following: • MRI Brain without and with contrast (CPT® 70553) • MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

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Indication	Medically Necessary Imaging Study
Treatment response, every 2 cycles of treatment, prior to local control, and at the end of planned therapy in individuals with NRSTS	Either of the following: • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250), and • MRI without and with contrast of primary site ◦ CT if contraindication to MRI and • CT Abdomen and Pelvis with contrast (CPT® 74177) for the same indications as abdominal/ pelvic imaging for initial staging • Imaging of all known metastatic sites using the same conventional imaging modality as per initial staging OR • PET/CT (CPT® 78815) if disease visible on initial staging PET but not on conventional imaging ◦ Whole-body PET/CT (CPT® 78816) if there is clinical suspicion of skull or distal lower extremity involvement
ANY of the following, if PET positive at initial diagnosis in individuals with NRSTS: • Assessment prior to local control surgery or radiation therapy • Evaluation of residual mass visible on conventional imaging as part of end of therapy evaluation • Rare circumstances when PET results are likely to result in a treatment change for the individual, including a change from active treatment to surveillance	• PET/CT (CPT® 78815) ◦ Whole-body PET/CT (CPT® 78816) if there is clinical suspicion of skull or distal lower extremity involvement ◦ Once PET has been documented to be negative for a given individual's cancer or all PET-avid disease has been surgically resected, PET is not considered medically necessary for continued disease monitoring or surveillance unless one of the exceptions in section **General Guidelines (PEDONC-1.0)** applies.

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Indication	Medically Necessary Imaging Study
Restaging following local control surgery in individuals with NRSTS	ALL of the following: • MRI without and with contrast of the primary site ◦ CT if contraindication to MRI • Imaging of all known metastatic sites using the same conventional imaging modality as per initial staging • CT Abdomen and Pelvis with contrast (CPT® 74177) for the same indications as abdominal/ pelvic imaging for initial staging
Surveillance, low grade, localized NRSTS of extremity or trunk treated with resection (with or without radiation) or chemotherapy in individuals with NRSTS	Every 3 months for the first 12 months, then every 4 months in years 2 and 3, and every 6 months in years 4 and 5, then annually thereafter: • MRI without and with contrast of the primary site • CT if MRI contraindicated AND Every 6 months for 3 years, then annually thereafter: • CT Abdomen and Pelvis with contrast (CPT® 74177) for the same indications as abdominal/ pelvic imaging for initial staging • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)
Surveillance for all other NRSTS	Every 3 months for the first 2 years, then every 6 months in years 3 and 4, and then annually: • MRI without and with contrast of the primary site ◦ CT if MRI contraindicated ◦ Nuclear bone scan (see: **PEDONC-1.3** for coding) for surveillance of known bony metastases • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • CT Abdomen and Pelvis with contrast (CPT® 74177) for the same indications as abdominal/ pelvic imaging for initial staging

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Indication	Medically Necessary Imaging Study
ANY of the following in individuals with NRSTS: • Angiosarcoma • Alveolar soft part sarcoma • Cardiac sarcoma	• In addition to the above studies: ◦ MRI Brain without and with contrast (CPT® 70553) annually For surveillance of individuals with known brain metastases, see: **Brain Metastases (ONC-31.3)**
Surveillance for recurrent NRSTS	ALL of the following after successful treatment for recurrent disease, every 3 months for 1 year (surveillance after year 1 should follow the standard timing listed in the appropriate surveillance section above): • CT Chest (CPT® 71260) with contrast • CT with contrast or MRI without and with contrast of the primary site • CT Abdomen and Pelvis with contrast (CPT® 74177) for the same indications as abdominal/ pelvic imaging for initial staging
ANY of the following in individuals with NRSTS: • Conventional imaging (CT, MRI, US, plain film) during surveillance reveals findings that are inconclusive or suspicious for recurrence, and PET avidity will determine whether biopsy or continued observation is appropriate • Obvious clinical symptoms show strong evidence suggesting recurrent and PET would replace conventional imaging modalities	• PET/CT (CPT® 78815) ◦ Whole-body PET/CT (CPT® 78816) if there is clinical suspicion of skull or distal lower extremity involvement

Background and Supporting Information

- NRSTS include all pediatric soft tissue sarcomas other than RMS and encompass a wide range of histologic subtypes with variable aggressiveness and metastatic potential (Acord et al., 2023; NCCN, 2026).

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- Because NRSTS can arise from any soft tissue, presenting symptoms and primary tumor locations vary widely and influence imaging selection (Acord et al., 2023).
- Many pediatric patients with localized NRSTS are treated with surgical resection alone and transition directly into surveillance imaging (Acord et al., 2023).
- Due to limited pediatric-specific surveillance data, imaging recommendations incorporate pediatric literature and NCCN guidance for similar histologies (NCCN, 2026).

Evidence Discussion

- Extrapulmonary metastatic disease is uncommon at initial presentation in most NRSTS, supporting omission of routine CT Abdomen and Pelvis imaging in asymptomatic pediatric patients (Acord et al., 2023; Expert Panel on Musculoskeletal Imaging, 2022).
- MRI with and without contrast remains the preferred modality for evaluation and surveillance of the primary tumor site (Acord et al., 2023; Expert Panel on Musculoskeletal Imaging, 2022).
- FDG-PET imaging has not demonstrated consistent benefit for treatment response assessment or routine surveillance in NRSTS and may increase false-positive findings (Acord et al., 2023).
- Stable residual masses without interval growth on conventional imaging do not justify PET imaging, even when residual FDG avidity is present at therapy completion (Acord et al., 2023).
- Surveillance strategies emphasizing MRI of the primary site and chest imaging appropriately balance early detection of recurrence with minimization of radiation exposure and unnecessary testing (Expert Panel on Musculoskeletal Imaging, 2022; NCCN, 2026).

Health Equity Considerations

NRSTS comprise a heterogeneous group of rare malignancies affecting children, adolescents, and young adults, with outcomes influenced not only by tumor biology and stage but also by socioeconomic factors. Population-based evidence demonstrates that insurance status, a proxy for income and access to care, is strongly associated with survival in pediatric and young adult patients with bone and soft tissue sarcomas, including NRSTS. Patients with low income public insurance or no insurance experience significantly worse overall survival compared with privately insured patients, a disparity that persists across localized, regional, and metastatic disease stages (Penumarthy et al., 2020). Importantly, low income patients are nearly twice as likely to present with metastatic disease at diagnosis, indicating that structural barriers such as delays in evaluation, limited access to specialized care, and reduced availability of timely diagnostic imaging may contribute to more advanced disease at presentation (Penumarthy et al., 2020).

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Survival disparities associated with insurance status are only partially explained by stage at diagnosis, suggesting that inequities extend beyond initial presentation to include differences in treatment delivery, adherence, and follow-up. Patients with public insurance often face challenges related to transportation, health literacy, financial toxicity, and access to multidisciplinary sarcoma centers, all of which may affect receipt of optimal local control, surveillance imaging, and management of treatment-related complications (Penumarthy et al., 2020). Adolescents and young adults represent a particularly vulnerable subgroup, with inferior outcomes that may be exacerbated by gaps in insurance coverage and transitions between pediatric and adult health systems. There should be an explicit focus on health equity, supporting consistent staging, response assessment, and surveillance regardless of insurance status or socioeconomic background. Ensuring equitable access to high-quality imaging across disease stages may help mitigate delays in diagnosis and reduce outcome disparities for historically underserved pediatric and young adult populations with NRSTS (Penumarthy et al., 2020).

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Bone Tumors (PEDONC-9)

Guideline

Bone Tumors – General Considerations (PEDONC-9.1)
Benign Bone Tumors (PEDONC-9.2)
Osteogenic Sarcoma (OS) (PEDONC-9.3)
Ewing Sarcoma Family of Tumors (ESFT), Including Primitive Neuroectodermal Tumors (PNET) (PEDONC-9.4)
References (PEDONC-9)

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Bone Tumors – General Considerations (PEDONC-9.1)

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Criteria

These guidelines include both benign and malignant lesions.

- Unless specified below, individuals who are <18 years old should be imaged according to this guideline section. Exceptions include:
  - Osteogenic sarcoma in individuals of all ages should be imaged according to guidelines in **Osteogenic Sarcoma (OS) (PEDONC-9.3)**.
  - Ewing Sarcoma and Primitive Neuroectodermal Tumor in individuals of all ages should be imaged according to guidelines in **Ewing Sarcoma and Primitive Neuroectodermal Tumors (ESFT) (PEDONC-9.4)**.
  - Chondrosarcoma in individuals of all ages should be imaged according to guidelines in **Bone Sarcomas – Initial Work-up/Staging (ONC-12.6)**.
  - Chordoma in individuals of all ages should be imaged according to guidelines in **Bone Sarcomas – Initial Work-up/Staging (ONC-12.6)**.
  - Giant cell tumor of bone and enchondroma in individuals of all ages should be imaged according to guidelines in **Benign Bone Tumors – General Considerations (ONC-12.9)**.
  - Other benign bone tumors in pediatric individuals should be imaged according to guidelines in **Benign Bone Tumors (PEDONC-9.2)**.
- Prosthetic devices for children after surgery for bony tumors are nearly all customized.
  - CT, contrast as requested in alignment with prosthetic manufacturer specifications, is considered medically necessary when requested by the operating surgeon for planning for customized-to-individual joint replacement or prosthetic surgery.
- All bone tumors should be evaluated by plain x-ray prior to any advanced imaging.
- PET does not reliably distinguish between benign and malignant bone tumors and should not be performed prior to biopsy.
- Where indications for PET/CT are noted, please note that indications and coding for rare circumstances where PET/MRI is considered medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**.
- CT Chest is superior to PET/CT for the detection of pulmonary metastases, and is considered medically necessary in the initial workup of all suspected malignant bone tumors.
  - CT Chest should be completed prior to anesthesia exposure, if possible.

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Background and Supporting Information

- Pediatric bone tumors encompass a spectrum of benign and malignant neoplasms, with osteosarcoma and Ewing sarcoma representing the most common primary malignant bone tumors in children and adolescents (NCCN, 2026).

Evidence Discussion

- Chest imaging is essential in malignant pediatric bone tumors, as the lungs are the most common site of metastatic disease (Expert Panel on Musculoskeletal Imaging, 2022; NCCN, 2026).
- Plain radiography is the cornerstone of initial evaluation for suspected bone tumors and frequently provides sufficient information to stratify lesions as benign, indeterminate, or aggressive (Expert Panel on Musculoskeletal Imaging, 2020).
- Initial evaluation with plain radiographs allows accurate biologic stratification in the majority of bone lesions and minimizes unnecessary advanced imaging and radiation exposure in children (Expert Panel on Musculoskeletal Imaging, 2020).
- MRI with and without contrast is the preferred modality for local staging of malignant bone tumors, providing superior assessment of intramedullary extent, soft-tissue involvement, and neurovascular relationships (Expert Panel on Musculoskeletal Imaging, 2020; NCCN, 2026).
- MRI enhances surgical planning and local staging accuracy while avoiding ionizing radiation, supporting its role as the preferred cross-sectional modality in pediatric bone malignancies (Expert Panel on Musculoskeletal Imaging, 2020; NCCN, 2026).
- Limiting advanced imaging to lesions with aggressive or indeterminate radiographic features balances diagnostic benefit with reduced radiation burden and cost (Expert Panel on Musculoskeletal Imaging, 2020).

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Benign Bone Tumors (PEDONC-9.2)

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Criteria

- Osteochondroma

Indication	Medically Necessary Imaging Study
Preoperative planning for individuals with osteochondroma	• MRI without and with contrast after evaluation by the operating surgeon • See: **General Considerations (PEDONC-9.1)** for requests related to prosthetic planning
• ANY of the following for individuals with osteochondroma: ◦ Concern for malignant transformation ◦ New or worsening pain/symptoms ◦ Change on a recent plain x-ray	• MRI without contrast or without and with contrast

- Osteoid osteoma

Indication	Medically Necessary Imaging Study
Suspected osteoid osteoma, based on clinical history and plain film findings	• CT without contrast
• ANY of the following in individuals wih osteois osteoma: ◦ CTs are not characteristic for diagnosis ◦ Individual has bone pain not localized to the area of findings on CT or x-ray	• ONE of the following: ◦ Triple phase bone scan (CPT® 78315) ◦ SPECT (CPT® 78803) ◦ Hybrid SPECT/CT (CPT® 78830)
• Individuals with osteoid osteoma with new pain who have been previously treated with radiofrequency ablation or curettage	• Bone scan (CPT® code 78830, 78315, or 78803 – as requested)

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- Other benign tumors
  - Refer to **Mass Involving Bone (Including suspected Lytic and Blastic Metastatic Disease) (PEDMS-3.4)**

Background and Supporting Information

- Many benign bone tumors demonstrate characteristic appearances on plain radiographs, allowing confident diagnosis without additional imaging (Expert Panel on Musculoskeletal Imaging, 2020).
- Osteochondroma is the most common benign bone tumor in pediatrics and is typically diagnostic on radiographs alone (Expert Panel on Musculoskeletal Imaging, 2020).

Evidence Discussion

- Reliance on radiographic diagnosis for benign-appearing bone lesions avoids unnecessary advanced imaging, sedation, radiation exposure, and downstream testing in pediatric patients (Expert Panel on Musculoskeletal Imaging, 2020).
- Advanced imaging (MRI or CT) is generally reserved for atypical appearances, symptomatic lesions, or preoperative planning (Expert Panel on Musculoskeletal Imaging, 2020).
- MRI or CT provides benefit primarily when complications, malignant transformation, or surgical planning must be assessed, supporting selective rather than routine use (Expert Panel on Musculoskeletal Imaging, 2020).
- This approach maintains diagnostic accuracy while minimizing harm and aligns with established pediatric imaging stewardship principles (Expert Panel on Musculoskeletal Imaging, 2020).

Health Equity Considerations

Benign bone tumors in children are frequently identified incidentally through radiographic imaging or after presentation with pain, swelling, or pathologic fracture, and timely access to diagnostic imaging plays a central role in preventing complications and unnecessary morbidity. Although these lesions are non-malignant, delays in evaluation or limited access to advanced imaging modalities can result in progression to structural instability, deformity, or fracture, disproportionately affecting children with barriers to specialty orthopedic or radiologic care. The large institutional series by Gozar et al. (2025) illustrates that a substantial proportion of benign bone tumors are discovered incidentally or at advanced stages requiring surgical intervention, emphasizing the importance of equitable access to early imaging and follow up across pediatric populations.

Health equity concerns are particularly relevant given the reliance on imaging modalities with differing availability and cost. Plain radiography is typically the first-line diagnostic tool and is widely accessible, while CT and MRI, often necessary for lesion

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characterization, surgical planning, or exclusion of malignancy, may be less accessible in low resource or underserved settings due to cost, geographic limitations, or radiation concerns in children. Disparities in access to MRI may contribute to variability in diagnostic certainty, biopsy decisions, and surgical planning, potentially leading to either overtreatment or delayed intervention for children from underserved communities (Gozar et al., 2025). Ensuring guideline-concordant use of imaging that balances diagnostic accuracy with resource stewardship is essential to minimizing inequities in care.

Additionally, benign bone tumors that cause pain, fractures, or functional limitation often require longitudinal surveillance or surgical management, which may be disrupted by socioeconomic barriers such as transportation challenges, limited health literacy, or inconsistent follow-up. The observation that pathologic fractures were associated with longer hospital stays highlights the downstream impact of delayed detection and underscores the importance of early, equitable imaging evaluation to prevent avoidable complications (Gozar et al., 2025). Imaging guidelines for benign bone tumors should therefore be applied with an equity lens, promoting timely access to appropriate imaging, consistent follow up, and multidisciplinary care coordination to reduce disparities in outcomes for all pediatric patients.

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Osteogenic Sarcoma (OS) (PEDONC-9.3)

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Criteria

Indication	Medically Necessary Imaging Study
Suspected or Biopsy Proven Diagnosis of OS	• MRI without and with contrast of the primary site OR • CT, contrast as request, of the primary site if there is a contraindication to MRI AND • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Chest is considered medically necessary in initial workup of all suspected malignant bone tumors in children and should be completed prior to anesthesia exposure if possible • These studies are considered medically necessary even when PET/CT has already been authorized or performed
Initial Staging of Biopsy Proven OS Disease	• 18F-FDG PET/CT whole-body (CPT® 78816) ◦ Nuclear bone scan (see: **(PEDONC-1.3)** for coding) if PET not available ◦ PET/CT is considered medically necessary in addition to the conventional imaging listed in the suspected/diagnosis sections • CT Abdomen and Pelvis with contrast (CPT® 74177) is not routinely considered medically necessary in the initial metastatic staging of pediatric OS but is considered medically necessary in the following situations: ◦ Evaluation of inconclusive PET findings ◦ Primary site of abdomen or pelvis
Suspected bony metastatic sites noted on PET or bone scan in individuals with OS	• MRI without and with contrast of the suspected metastatic site OR • CT with contrast of the suspected metastatic site

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Indication	Medically Necessary Imaging Study
Restaging after 10 to 12 weeks of neoadjuvant chemotherapy prior to local control surgery in individuals with OS	• MRI without and with contrast of primary site • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) • 18F-FDG PET/CT whole-body (CPT® 78816) or bone scan (see: **(PEDONC-1.3)** for coding)
Individuals with OS with metastatic disease undergoing current chemotherapy	• CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned chemotherapy • MRI without and with contrast of primary site can be performed every 2 cycles during treatment and at the end of planned chemotherapy • If previously positive for bony metastases, 18F-FDG PET/CT whole body (CPT® 78816) or bone scan (see: **(PEDONC-1.3)** for coding) every 2 cycles during treatment and at the end of planned chemotherapy • Imaging may be considered medically necessary more frequently around the time of surgical resection of primary or metastatic lesions to assess for resectability
Preoperative planning for local control surgery in individuals with OS	• CT, contrast as requested • MRA and/or CTA may rarely be considered medically necessary for complicated surgical resections, and is considered medically necessary after evaluation by the operating surgeon to clarify inconclusive MRI findings for preoperative planning • See: **General Considerations (PEDONC-9.1)** for advancing imaging requests related to prosthetic planning

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Indication	Medically Necessary Imaging Study
Following local control surgery, until the end of planned adjuvant chemotherapy in individuals with OS	• MRI without and with contrast of primary site ~6 weeks after surgical procedure, and at the end of planned chemotherapy • Plain x-rays of the primary site and chest immediately after local control and then every 2 months between the medically necessary, listed advanced imaging studies. • CT Chest with (CPT® 71260) or without contrast (CPT® 71250): ◦ Measurable pulmonary metastases: every 6 weeks, and at the end of planned chemotherapy ◦ No measurable pulmonary metastases: every 4 months, and at the end of planned chemotherapy • Bone scan (see: **(PEDONC-1.3)** for coding) every 4 months, and at the end of planned chemotherapy ◦ 18F-FDG PET/CT whole-body (CPT® 78816) in place of bone scan, if positive for distant bone metastases at initial diagnosis
Recurrent metastatic or recurrent unresectable disease on treatment in individuals with OS	• The following every 2 cycles of treatment, and at the end of planned chemotherapy: ◦ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ MRI without and with contrast of primary site ◦ PET is generally not considered medically necessary during active treatment for recurrent pediatric cancer. In rare circumstances, 18F-FDG PET/CT imaging with CPT® 78816 may be considered medically necessary when results are likely to result in a treatment change for the individual, including a change from active treatment to surveillance.

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Indication	Medically Necessary Imaging Study
Surveillance (all individuals regardless of primary site) in individuals with OS	• Any or all of the following every 3 months for year 1 and 2, then every 4 months in year 3, then every 6 months in year 4 and 5 after completion of all therapy ◦ CT or MRI of primary site as performed during suspected or initial disease workup (provided the individual does not have an endoprosthesis that will cause MRI or CT artifact): ▪ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) • Bone scan (see: **(PEDONC-1.3)** for coding) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy
Suspected recurrence in individuals with OS	• MRI without and with contrast of the primary site and / or site of suspected recurrence based on symptoms or other imaging OR • CT, contrast as request, of the primary site and/or site of suspected recurrence based on symptoms or other imaging if there is a contraindication to MRI AND • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Chest is considered medically necessary in initial workup of all suspected malignant bone tumors in children and should be completed prior to anesthesia exposure if possible • CT Abdomen and Pelvis with contrast (CPT® 74177) is not routinely considered medically necessary in the metastatic staging of pediatric OS, but is considered medically necessary in the following situations: ◦ Evaluation of inconclusive PET findings ◦ Primary site of abdomen or pelvis • These studies are considered medically necessary even when PET/CT has already been authorized or performed

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Indication	Medically Necessary Imaging Study
• For suspected recurrence in individuals with OS, ANY of the following: ◦ Conventional imaging reveals findings that are inconclusive or suspicious for recurrence and PET avidity will determine whether biopsy or continued observation is appropriate ◦ Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities	• 18F-FDG PET/CT (CPT® 78816)
• Biopsy-proven recurrence in individuals with OS	• PET/CT whole-body (CPT® 78816) for biopsy-proven recurrence ◦ If disease is considered potentially resectable, follow osteosarcoma treatment response as previous

Background and Supporting Information

- Osteosarcoma is the most common primary malignant bone tumor in children and adolescents, typically arising in the metaphyses of long bones (NCCN, 2026).

Evidence Discussion

- MRI with and without contrast is essential for local staging, including evaluation of intramedullary tumor extent and skip lesions. MRI-based local staging improves surgical planning and limb-salvage outcomes while avoiding ionizing radiation exposure (Expert Panel on Musculoskeletal Imaging, 2020; NCCN, 2026).
- Chest CT is required for metastatic evaluation, as pulmonary metastases are the most frequent site of disease spread. Chest CT improves detection of small

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pulmonary metastases that influence staging and treatment decisions compared with chest radiography alone (Expert Panel on Musculoskeletal Imaging, 2022).
- FDG-PET/CT or bone scan may be used for whole-body evaluation, but findings require correlation with conventional imaging (NCCN, 2026).
- Whole-body PET/CT can identify metastatic disease but carries higher radiation exposure and potential false positives; selective use mitigates unnecessary downstream interventions (NCCN, 2026).
- Surveillance strategies focusing on the primary site and chest balance early recurrence detection with cumulative radiation risk in long-term survivors (NCCN, 2026).

Health Equity Considerations

OS (osteosarcoma) is a rare but highly aggressive bone malignancy in children, adolescents, and young adults, and substantial evidence demonstrates that social and demographic factors influence disease presentation and care processes even when overall survival differences are attenuated after adjustment for disease severity. Population-based analyses show that Hispanic children are more likely to present with metastatic disease and larger primary tumors at diagnosis, while patients from communities with high language isolation are also at increased risk of advanced presentation, suggesting barriers to early evaluation and diagnostic imaging (Fritz et al., 2025; Goulding et al., 2024). Delays between diagnosis and initiation of treatment are more common among non Hispanic Black patients and adolescents and young adults, underscoring the role of structural barriers such as healthcare access, communication challenges, and care coordination during transitions from pediatric to adult systems (Fritz et al., 2025).

Access to high-quality imaging is a critical equity issue in OS, as accurate staging, assessment of local extent, and detection of metastases directly inform surgical planning and prognosis. Disparities in insurance coverage and county-level socioeconomic indicators have been associated with higher odds of amputation and increased mortality in population studies, particularly among publicly insured patients, even when controlling for metastatic status (Goulding et al., 2024). These findings suggest that inequitable access to specialized imaging, sarcoma-experienced multidisciplinary teams, and limb salvage-oriented care pathways may influence treatment intensity and long term outcomes. Consistent, guideline-based imaging is therefore essential to reduce variation in staging accuracy and treatment decision making across populations.

Importantly, evidence from Children's Oncology Group clinical trial cohorts demonstrates that when children with non-metastatic OS receive standardized, protocol-driven care, overall and event-free survival do not differ by race, ethnicity, or proxied poverty exposures, highlighting the capacity of equitable care delivery to mitigate disparities (Ilcisin et al., 2024). However, stark differences in post-relapse survival persist, with non-Hispanic Black children experiencing substantially worse outcomes after disease

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recurrence, likely reflecting inequities in access to aggressive surveillance imaging, timely relapse detection, and specialized post-relapse interventions (Ilcisin et al., 2024). Imaging guidelines for OS should therefore be applied with an explicit health equity lens, emphasizing timely, comprehensive imaging at diagnosis, during therapy, and in surveillance to support early detection, coordinated care, and equitable outcomes across diverse pediatric populations.

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Ewing Sarcoma Family of Tumors (ESFT), Including Primitive Neuroectodermal Tumors (PNET) (PEDONC-9.4)

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Criteria

Indication	Medically Necessary Imaging Study
Suspected/Diagnosis of ESFT or PNET – ill-defined or non-discrete soft tissue mass without bony involvement	• US (CPT® 76881 or 76882) in addition to plain x-ray
Suspected or Biopsy Proven Diagnosis of ESFT or PNET – Primary site	• MRI without and with contrast ◦ CT, contrast as requested, if there is a contraindication to MRI • MRA and/or CTA may rarely be considered medically necessary for complicated surgical resections, and is considered medically necessary after evaluation by the operating surgeon to clarify inconclusive MRI findings for preoperative planning • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Chest is considered medically necessary in initial workup of all suspected or confirmed malignant bone tumors in children and should be completed prior to anesthesia exposure if possible • These studies are considered medically necessary even when PET/CT has already been authorized or performed

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Indication	Medically Necessary Imaging Study
Suspected or Biopsy Proven Diagnosis of ESFT or PNET – Chest wall primary	• MRI Chest without and with contrast AND • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Chest is considered medically necessary in initial workup of all suspected or confirmed malignant bone tumors in children and should be completed prior to anesthesia exposure if possible • These studies are considered medically necessary even when PET/CT has already been authorized or performed
Initial Staging (additional imaging after biopsy confirmed disease) of ESFT or PNET	• PET/CT whole-body (CPT® 78816) ◦ Bone scan (see **(PEDONC-1.3)** for coding) substituted for PET imaging if PET not available ◦ PET/CT is considered medically necessary in addition to the conventional imaging listed in the suspected/diagnosis sections
• For ANY of the following in individuals with ESFT or PNET: ◦ Evaluation of inconclusive PET findings ◦ Primary site involving the abdomen or pelvis	• CT Abdomen and Pelvis with contrast (CPT® 74177)

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Indication	Medically Necessary Imaging Study
Restaging after 10 to 12 weeks of neoadjuvant chemotherapy prior to local control surgery in individuals with ESFT or PNET	Imaging modality should be the same as used for initial staging, any or all from the list below as described: • MRI without and with contrast of the primary site • CT (contrast as requested) if requested per valuation by the operating surgeon for pre-operative planning ◦ See **General Considerations (PEDONC-9.1)** for imaging requests related to prosthetic planning. • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) • ONE of the following: ◦ PET/CT whole-body (CPT® 78816) ◦ Whole-body bone scan (see **PEDONC-1.3** for coding) ◦ MRI bone marrow blood supply/diffusion-weighted MRI with ADC (CPT® 77084)
Treatment response following local control surgery in individuals with ESFT or PNET	• MRI without and with contrast of primary site 3 months after surgical procedure and at the end of planned chemotherapy • Plain x-rays of the primary site and chest immediately after local control then every 3 months • CT Chest with (CPT® 71260) or without contrast (CPT® 71250): ◦ Measurable pulmonary metastases: every 6 weeks and at the end of planned chemotherapy ◦ No measurable pulmonary metastases: every 3 months and at the end of planned chemotherapy • Whole-body bone scan (see **PEDONC-1.3** for coding) at the end of planned chemotherapy • PET/CT whole-body (CPT® 78816) for clinical or imaging findings suggestive of local recurrence

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Indication	Medically Necessary Imaging Study
Individuals with metastatic disease undergoing current chemotherapy in individuals with ESFT or PNET	• CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 2 cycles during treatment and at the end of planned chemotherapy • MRI without and with contrast of primary site every 2 cycles during treatment and at the end of planned chemotherapy • If previously positive for bony metastases, PET/CT whole-body (CPT® 78816) or bone scan (see **PEDONC-1.3** for coding) every 2 cycles during treatment and at the end of planned chemotherapy • Imaging may be considered medically necessary more frequently around the time of surgical resection of primary or metastatic lesions to assess for resectability • CT with contrast of other sites of involvement
Recurrent metastatic or recurrent unresectable disease on treatment in individuals with ESFT or PNET	• Every 2 cycles of treatment, and at the end of planned chemotherapy: ◦ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ MRI without and with contrast of primary site ◦ PET imaging is considered medically necessary when results are likely to result in a treatment change for the individual, including a change from active treatment to surveillance.

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Indication	Medically Necessary Imaging Study
Surveillance for all disease **other than** low grade, stage I disease in individuals with ESFT or PNET	• Every 3 months for year 1 and 2, then every 4 months in year 3, then every 6 months in year 4 and 5, and annually for 5 years after completion of all therapy to complete 10 years of surveillance: ◦ CT or MRI of primary site as performed during suspected or initial disease workup (provided the individual does not have an endoprosthesis that will cause MRI or CT artifact): ◦ Bone scan (see **PEDONC-1.3** for coding) • Every 3 months for year 1 and 2, then every 4 months in year 3, then every 6 months in year 4 and 5: ◦ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ After year 5, CXR should be used for surveillance
Surveillance for low grade stage I disease only in individuals with ESFT or PNET	• Every 3 months for year 1 and 2, then every 4 months in year 3, then every 6 months in year 4 and 5, and annually for 5 years after completion of all therapy to complete 10 years of surveillance: ◦ CT or MRI of primary site as performed during suspected or initial disease workup (provided the individual does not have an endoprosthesis that will cause MRI or CT artifact) ◦ Bone scan (see **PEDONC-1.3** for coding) • Every 3 months for year 1 and 2 ◦ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ After 24 months off therapy, CXR should be used for surveillance with CT considered medically necessary for new or inconclusive findings on CXR

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Indication	Medically Necessary Imaging Study
Suspected recurrence in individuals with ESFT or PNET	• MRI without and with contrast of the primary site and/or site of suspected recurrence based on symptoms or other imaging, OR • CT, contrast as request, of the primary site and/or site of suspected recurrence based on symptoms or other imaging if there is a contraindication to MRI AND • CT Chest with (CPT® 71260) or without contrast (CPT® 71250) ◦ CT Chest is considered medically necessary in initial workup of all suspected malignant bone tumors in children and should be completed prior to anesthesia exposure if possible • CT Abdomen and Pelvis with contrast (CPT® 74177) is not considered medically necessary in the metastatic staging of pediatric EWS but is considered medically necessary in the following situations only: ◦ Evaluation of inconclusive PET findings ◦ Primary site of abdomen or pelvis • The studies above are considered medically necessary even when PET/CT has already been authorized or performed

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Indication	Medically Necessary Imaging Study
• For suspected recurrence in individuals with ESFT or PNET, any of the following: ◦ Conventional imaging reveals findings that are inconclusive or suspicious for recurrence and PET avidity will determine whether biopsy or continued observation is appropriate ◦ Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities	PET/CT whole-body (CPT® 78816)
• Biopsy proven recurrence in individuals with ESFT or PNET	• Refer to ESFT initial imaging for studies for suspected recurrence. • PET/CT whole-body (CPT® 78816) • If disease is considered potentially resectable, follow ESFT treatment response as previously noted

- 18F-FDG PET/CT can replace bone scan and bone marrow biopsy in ESFT individuals and is considered medically necessary in the initial staging of all ESFT individuals after histologic diagnosis is established.

Background and Supporting Information

- ESFT includes Ewing sarcoma of bone, extraosseous Ewing sarcoma, Askin tumor, and PNET, characterized by aggressive behavior and a high propensity for metastatic spread (NCCN, 2026).
- Bone and bone marrow metastases occur with sufficient frequency in ESFT to significantly alter staging, prognosis, and therapy (NCCN, 2026).

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Evidence Discussion

- Identification of bone and bone marrow metastases at diagnosis markedly changes treatment approach and prognosis, justifying comprehensive staging in ESFT (NCCN, 2026).
- MRI of the primary site and chest CT are integral components of initial staging (NCCN, 2026).
- FDG-PET/CT is preferred over conventional bone scan for detection of skeletal and nodal metastatic disease. FDG-PET/CT demonstrates high sensitivity and specificity for metastatic disease and can detect lesions occult on conventional imaging (NCCN, 2026).
- Routine use of MRI and PET/CT at defined disease milestones maximizes diagnostic yield while avoiding repetitive or low-value imaging during therapy (NCCN, 2026).
- Structured surveillance that emphasizes clinically impactful sites reduces radiation exposure and false-positive findings without compromising outcome assessment (NCCN, 2026).

Health Equity Considerations

ESFT, including PNET, disproportionately affects children, adolescents, and young adults, and a growing body of evidence demonstrates that sociodemographic factors shape disease presentation and early care. Population-based analyses show that Hispanic patients are more likely than non-Hispanic White patients to present with larger tumors and metastatic disease at diagnosis, while adolescents and young adults more frequently present with axial or pelvic tumors and disseminated disease compared with younger children (Fritz et al., 2024; Goulding et al., 2024). These patterns are clinically meaningful, as tumor size, metastatic burden, and axial location are among the strongest predictors of survival in ESFT (Wells et al., 2024). Barriers such as language isolation, underinsurance, and limited access to specialty care likely contribute to diagnostic delay and more advanced presentation in historically marginalized populations, reinforcing the need for early, accessible diagnostic evaluation (Fritz et al., 2024; Goulding et al., 2024).

Equitable access to timely, high-quality imaging is therefore essential to improving outcomes in ESFT, given the disease's propensity for early spread to lung, bone, and bone marrow and the central role of imaging in staging, surgical planning, and treatment selection. Adolescents and young adults are more likely to experience delays between diagnosis and treatment initiation, potentially reflecting challenges during transitions in care and gaps in insurance coverage, which may be exacerbated by delayed or incomplete imaging (Fritz et al., 2024). Disparities in treatment delivery further compound these risks, as non Hispanic-Black patients have been shown to be less likely to receive chemotherapy even after accounting for disease stage, and rural

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or socioeconomically disadvantaged communities face barriers to sarcoma experienced multidisciplinary care (Fritz et al., 2024; Goulding et al., 2024).

Diagnostic challenges in rare PNET subtypes, including CNS PNETs, further illustrate how limited access to advanced imaging and biopsy can lead to underdiagnosis and delayed therapy (Chamdine et al., 2018). Applying ESFT imaging guidelines with an explicit health equity lens, emphasizing prompt staging, consistent surveillance, and referral to specialized centers, may help reduce diagnostic delay, support timely multimodality treatment, and promote more equitable outcomes across pediatric and young adult populations (Wells et al., 2024).

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Pediatric Germ Cell Tumors (PEDONC-10)

Guideline

Pediatric Germ Cell Tumors (PEDONC-10)
References (PEDONC-10)

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Pediatric Germ Cell Tumors (PEDONC-10)

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Criteria

- Sex cord stromal tumors (granulosa cell, theca, sertoli, and leydig tumors) are rare in pediatrics and should be imaged according to general guidelines in: **Testicular, Ovarian and Extragonadal Germ Cell Tumors (ONC-20)** in the Oncology Imaging Guidelines
- This section applies to primary germ cell tumors occurring outside the central nervous system in children who are ≤15 years old at the time of initial diagnosis.
  - For individuals who are >15 years old at diagnosis, the overall prognosis is inferior and these individuals should be imaged according to general guidelines in: **Testicular, Ovarian and Extragonadal Germ Cell Tumors (ONC-20)** in the Oncology Imaging Guidelines.
- For CNS germ cell tumors, use the imaging guidelines in: **CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT) (PEDONC-4.7)**.

Indication	Medically Necessary Imaging Study

Initial staging for all individuals with germ cell tumors	• CT Abdomen and Pelvis with contrast (CPT® 74177)
	  ◦ For testicular masses, MRI Abdomen without and with contrast (CPT® 74183) and CT Pelvis with contrast (CPT® 72193) are considered medically necessary instead, if requested
	• CT Chest with contrast (CPT® 71260)
	  ◦ Should be completed prior to anesthesia exposure if possible

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Indication	Medically Necessary Imaging Study
• Initial staging in individuals with germ cell tumors, in lieu of CT Abdomen and Pelvis with contrast (above), for ANY of the following: ◦ Proven or highly suspected ovarian neoplasm that was already imaged with ultrasound ◦ Immature sacrococcygeal teratoma suspected on other imaging ◦ Contraindication to CT contrast OR • To clarify inconclusive findings on initial staging CT	• MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
• Ovarian masses that are <10cm in size, have minimal or no visible solid component on ultrasound, and have normal tumor markers	• These are almost universally benign teratomas or functional cysts; thus, advanced imaging is not considered medically necessary
• Additional initial evaluation for individuals with germ cell tumors with ANY of the following: ◦ Symptoms suggesting CNS metastases ◦ Choriocarcinoma syndrome (hemorrhagic metastatic disease to lung with extremely elevated HCG) HCG >10,000miU/ml	• MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Additional initial evaluation for individuals with germ cell tumors with systemic symptoms or bone pain	• Nuclear bone scan (See: **PEDONC-1.3** for coding)
Restaging in individuals with germ cell tumors with disease not completely resected at initial diagnosis	• Every 2 cycles (~every 6 weeks) and at the end of planned therapy: ◦ CT Chest/Abdomen/Pelvis (CPT® 71260 and CPT® 74177) with contrast ▪ CT imaging may be considered medically necessary more frequently to assess for surgical resectability in individuals who have received more than 4 cycles of chemotherapy ▪ MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) in lieu of CT abdomen and pelvis for ovarian neoplasms if this modality was used for initial staging or for contraindication to CT contrast ◦ Imaging of any metastatic sites with the same modality used during initial staging
• Suspicious lesion seen on CT and both of the following in individuals with germ cell tumors: ◦ Relapse risk is determined to be low by the treating physician ◦ Biopsy would cause unnecessary morbidity for the individual	• Short-interval CT study of the involved area

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Indication	Medically Necessary Imaging Study
Stage I individuals with germ cell tumors 0-10 years of age treated with surgery only	• Chest x-ray should be completed every 3 months for 1 year, then every 6 months in year two, to complete two years surveillance after completion of all therapy ◦ For those with primary mediastinal tumors at diagnosis, CT Chest with contrast (CPT® 71260) in lieu of CXR according to the above schedule. • Every 3 months for 1 year, then every 6 months in year two, to complete two years surveillance after completion of all therapy: ◦ CT Abdomen/Pelvis with contrast (CPT® 74177) ▪ MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) substituted for surveillance for ovarian neoplasm if this modality was used for initial staging
Stage I individuals with germ cell tumors 11 years of age or older treated with surgery only	• Every 4 months for 2 years, then every 6 months for 1 year, then every 12 months for 2 years to complete 5 years surveillance imaging after completion of all therapy: ◦ Chest x-ray ◦ For individuals with primary mediastinal tumors at diagnosis, CT Chest with contrast (CPT® 71260) in lieu of chest x-ray on the above schedule. • Every 4 months for 2 years, then every 6 months for 1 year, then every 12 months for two years to complete 5 years surveillance ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) ▪ MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) substituted for surveillance for ovarian neoplasm if this modality was used for initial staging

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Indication	Medically Necessary Imaging Study
Stage II-IV individuals with germ cell tumors	• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) and CT Abdomen and Pelvis with contrast (CPT® 74177) every 3 months for 1 year then every 6 months in year 2, then annually in years 3-5 after completion of all therapy. ◦ MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) substituted for surveillance for ovarian neoplasm if this modality was used for initial staging • Individuals with brain or bone metastases should have surveillance imaging of those areas on the same schedule as the primary site imaging with the same modality used during initial staging
• Suspected Recurrence in individuals with germ cell tumors: ◦ Any clinically significant rise in tumor markers ◦ Symptoms suggesting recurrent disease ◦ Abnormal chest x-ray	• CT Chest with contrast (CPT® 71260) and CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) in lieu of CT for suspected recurrence of immature sacrococcygeal tumor or ovarian neoplasm or for contraindication to CT contrast • Whole-body bone scan (CPT® 78306) for individuals with a history of bone involvement or with bone pain
Clarify inconclusive findings on conventional imaging in individuals with germ cell tumors	PET/CT (CPT® 78815)

Background and Supporting Information

- Pediatric germ cell tumors are a heterogeneous group of malignant neoplasms arising from primordial germ cells and most commonly occur in the gonads (testes or ovaries) or extragonadal sites along the midline, including the abdomen, pelvis, mediastinum, and sacrococcygeal region (NCCN, 2026).
- Malignant pediatric germ cell tumors commonly include yolk sac tumor, embryonal carcinoma, choriocarcinoma, and mixed germ cell tumors (which may include immature teratomatous elements). The majority of pediatric germ cell tumors are non-seminomatous (NCCN, 2026).

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- Pediatric germ cell tumors may arise in testicular, ovarian, or extragonadal locations. Tumor location influences initial imaging modality, staging evaluation, and surgical planning (NCCN, 2026).
- Overall treatment strategies for malignant germ cell tumors are similar regardless of primary site. Localized disease is often treated with surgery alone, while advanced or high-risk disease is treated with multimodality therapy including combination chemotherapy. Imaging is used for staging, response assessment, and surveillance and must account for long-term survivorship (NCCN, 2026).
- Serum tumor markers, including alpha-fetoprotein (AFP) and beta-human chorionic gonadotropin (β-hCG), are integral to diagnosis, staging, response assessment, and surveillance, and often reduce reliance on serial imaging studies (NCCN, 2026).

Evidence Discussion

- Ultrasound, combined with serum tumor markers, is supported as the primary initial imaging modality for suspected ovarian, testicular, and abdominal extragonadal pediatric germ cell tumors, providing high diagnostic yield without radiation exposure. This approach minimizes harm while preserving sensitivity for initial disease detection (NCCN, 2026).
- Cross-sectional imaging of the chest, abdomen, and pelvis is considered medically necessary for initial staging when a suspected germ cell tumor is identified, as imaging findings guide surgical approach and assess for metastatic disease. This targeted use provides clinical benefit when performed prior to histologic confirmation (NCCN, 2026).
- Decline and normalization of AFP and β-hCG are reliable indicators of treatment response in pediatric germ cell tumors. Evidence supports prioritizing tumor marker trends over routine imaging for response assessment, reducing unnecessary radiation exposure and false-positive findings (NCCN, 2026).
- Surveillance strategies emphasizing frequent tumor marker assessment with limited imaging are supported by high cure rates and early biochemical detection of recurrence. Restricting routine imaging mitigates cumulative radiation risks, anesthesia exposure, and downstream testing in long-term pediatric survivors (NCCN, 2026).
- Chest radiography is the preferred surveillance imaging modality for thoracic evaluation in stages I-IV disease, balancing adequate detection of pulmonary relapse with lower radiation dose compared with CT imaging (NCCN, 2026).
- There is no evidence supporting routine use of PET or PET/CT in pediatric germ cell tumor evaluation. Data demonstrate that PET does not reliably predict treatment response or individual outcomes and offers no added benefit over conventional imaging in this population (NCCN, 2026).
- Suspicious lesions identified on conventional imaging require tissue confirmation, as imaging alone cannot reliably distinguish viable malignancy from post-treatment

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changes, residual teratoma, or necrosis. This approach prevents inappropriate escalation of therapy (NCCN, 2026).
- Given excellent long-term survival outcomes for pediatric germ cell tumors, imaging strategies emphasize diagnostic sufficiency while minimizing late effects, aligning clinical benefit with harm reduction principles central to pediatric imaging guidelines (NCCN, 2026).

Health Equity Considerations

Pediatric germ cell tumors (GCTs) demonstrate important disparities in incidence, stage at diagnosis, and survival across sex and race/ethnicity, with implications for timely imaging and risk stratification. Population-based analyses show that survival differences are most pronounced among males, with Hispanic and Asian/Pacific Islander boys experiencing significantly higher mortality compared with non-Hispanic White males, whereas no consistent survival differences are observed among females (Williams et al., 2021). In Hispanic males with gonadal tumors, more advanced stage at diagnosis partially mediates this disparity, suggesting that delayed detection and diagnosis contribute to worse outcomes, while persistent mortality differences in other subgroups point to additional factors such as tumor biology or treatment response (Williams et al., 2021). Sex-based differences are also evident in intracranial GCTs, where males consistently demonstrate higher long-term mortality across histologic subtypes and disease stages, particularly in distant disease, despite overall improvements in early detection over time (Lin et al., 2025). These findings underscore the prognostic importance of cancer stage and sex in pediatric GCTs and highlight populations at higher risk for adverse outcomes.

Equitable access to timely, high-quality imaging is central to addressing these disparities, as imaging plays a critical role in tumor localization, staging, and treatment planning for both gonadal and intracranial GCTs. Advances in neuroimaging and surveillance have contributed to a shift toward increased detection of localized disease, which is associated with substantially lower mortality than regional or distant disease (Lin et al., 2025). However, persistent excess mortality in males and in children presenting with advanced-stage tumors suggests that improvements in imaging are not uniformly realized across populations. Delays in diagnosis, differences in referral patterns to specialty centers, and potential barriers related to socioeconomic factors or healthcare access may disproportionately affect certain racial and ethnic groups, particularly Hispanic males (Williams et al., 2021). Applying pediatric GCT imaging guidelines with a health equity lens, emphasizing early evaluation, comprehensive staging at presentation, and consistent follow-up imaging, may help reduce diagnostic delay, support timely initiation of guideline concordant therapy, and promote more equitable outcomes across pediatric populations (Lin et al., 2025).

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Pediatric Liver and Pancreatic Tumors (PEDONC-11)

Guideline

Pediatric Liver and Pancreatic Tumors – General Considerations (PEDONC-11.1)
Hepatoblastoma (PEDONC-11.2)
Pediatric Hepatocellular Carcinoma (HCC) (PEDONC-11.3)
Pediatric Pancreatic Carcinoma (PEDONC-11.4)
References (PEDONC-11)

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Pediatric Liver and Pancreatic Tumors – General Considerations (PEDONC-11.1)

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Criteria

- Primary hepatic germ cell tumors should follow imaging guidelines in: **Pediatric Germ Cell Tumors (PEDONC-10)**.
- Primary hepatic sarcomas should follow imaging guidelines in: **Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS) (PEDONC-8.3)**.
- Imaging requests relating to liver transplant surgery and surveillance should follow guidelines in section **Transplant (AB-42)** in the Abdomen Imaging Guidelines.

Background and Supporting Information

- Pediatric liver and pancreatic tumors are rare and biologically distinct from adult malignancies, requiring tailored imaging approaches that minimize radiation exposure while supporting accurate diagnosis, staging, and treatment planning (NCCN, 2026).
- Pediatric hepatic malignancies are dominated by hepatoblastoma and hepatocellular carcinoma, while pancreatic tumors are uncommon and most often low-grade epithelial neoplasms or embryonal tumors rather than invasive ductal adenocarcinoma (NCCN, 2026).
- Serum markers (e.g., AFP) are integral to diagnosis, response assessment, and surveillance in pediatric liver tumors, often reducing the need for repeated imaging studies (NCCN, 2026).

Evidence Discussion

- Evidence supports ultrasound as the preferred initial imaging modality for pediatric hepatobiliary and pancreatic tumors, offering high diagnostic utility while avoiding radiation exposure (NCCN, 2026).
- Cross-sectional imaging improves staging accuracy and surgical planning when disease is suspected or confirmed but does not demonstrate benefit as routine surveillance in asymptomatic, marker-negative pediatric patients (NCCN, 2026).
- Limiting serial CT imaging aligns with evidence demonstrating excellent cure rates in pediatric tumors and heightened lifetime radiation sensitivity in children, supporting restrictive imaging criteria (NCCN, 2026).
- PET/CT has not demonstrated sufficient sensitivity, predictive value, or outcome benefit in pediatric liver or pancreatic tumors to justify routine use (NCCN, 2026).

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Hepatoblastoma (PEDONC-11.2)

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Criteria

Initial Staging

Indication	Medically Necessary Imaging Study
All individuals with suspected liver tumors	Abdominal ultrasound (CPT® 76700) is considered medically necessary even after MRI or CT imaging in order to allow evaluation for tumor thrombus
Individuals with a liver mass that is a biopsy proven primary liver malignancy or a liver mass that is clinically consistent with a primary liver mass	ANY of the following: • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) for evaluating tumor margins and vascular anatomy ◦ Hepatobiliary-specific contrast agents (gadoxetate, gadobenate [MultiHance]) are preferred if available and are considered medically necessary if requested, whether or not a prior gadolinium-enhanced MRI has been previously performed ◦ CT Abdomen and Pelvis with (CPT® 74177) is inferior to MRI for pediatric liver malignancies and is only considered medically necessary if MRI is not available, contraindicated, or sedation is required but not available, or to clarify specific inconclusive areas on MRI • MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) to evaluate vascular invasion

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Indication	Medically Necessary Imaging Study
Initial work-up for all pediatric liver tumors	CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • Should be completed prior to anesthesia exposure if possible
Initial evaluation of bony metastases in individuals with hepatoblastoma only with systemic symptoms or bone pain	Bone scan (See: **Modality General Considerations (PEDONC-1.3)**)
Symptoms suggesting CNS metastases in individuals with hepatoblastoma	MRI Brain without and with contrast (CPT® 70553)
Rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision-making in individuals with hepatoblastoma	PET/CT (CPT® 78815) • Indications and coding for rare circumstances where PET/MRI is medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

Treatment Response

- While the majority of individuals with hepatoblastoma will require abdomen and pelvis imaging at all time points, the pelvis imaging may be omitted at the discretion of the ordering physician

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Indication	Medically Necessary Imaging Study
Individuals with hepatoblastoma with incomplete resection	Every 2 cycles **and** at the end of planned therapy • CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen and Pelvis without and with contrast (CPT® 74178) is inferior to MRI for pediatric liver malignancies and is only considered medically necessary if MRI is not available, contraindicated, or sedation is required but not available • Imaging of any metastatic sites with the same modality used during initial staging
To evaluate vascular invasion in individuals with hepatoblastoma	MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175)
Tumor thrombus was detected at initial diagnosis in individuals with hepatoblastoma	Abdominal ultrasound (CPT® 76700) • If no tumor thrombus was present, continued ultrasound evaluations are not considered medically necessary without a specific reason documented in the clinical records
Rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision-making in individuals with hepatoblastoma	PET/CT (CPT® 78815) • Indications and coding for rare circumstances where PET/MRI is medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

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Surveillance Imaging

Indication	Medically Necessary Imaging Study
Surveillance in individuals with hepatoblastoma with an AFP of >100ng/mL	CT Chest with contrast (CPT® 71260) and MRI Abdomen without and with contrast (CPT® 74183) for any clinically significant rise in tumor markers or symptoms suggesting recurrent disease • CT Abdomen and Pelvis with contrast (CPT® 74177) is inferior to MRI for pediatric liver malignancies and is only considered medically necessary if MRI is not available, contraindicated, or sedation is required but not available, or to clarify specific inconclusive areas on MRI
Surveillance in individuals with hepatoblastoma with AFP ≤100ng/mL at diagnosis or recurrence	• MRI Abdomen with and without contrast (CPT® 74183) every 3 months for 2 years, then every 4 months for 2 years after completion of all therapy • Chest x-ray or CT Chest with contrast (CPT® 71260) every 3 months for 2 years, then every 4 months for 2 years after completion of all therapy • Individuals with brain or bone metastases should have surveillance imaging on the same schedule as the primary site imaging with the same modality used during initial staging

Background and Supporting Information

- Hepatoblastoma is the most common primary malignant liver tumor in children, typically diagnosed before 3 years of age, with a median age of approximately 19 months (NCCN, 2026).
- While most cases are sporadic, associations include Beckwith-Wiedemann syndrome, familial adenomatous polyposis, and trisomy 18 (NCCN, 2026).
- AFP is elevated in the majority of cases and is essential for diagnosis, treatment response assessment, and surveillance (NCCN, 2026).
- Localized tumors of pure fetal histology may be cured with surgery alone, while more advanced disease requires multimodality therapy, including chemotherapy and, in select cases, liver transplantation (NCCN, 2026).

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Evidence Discussion

- AFP monitoring reliably detects recurrence in hepatoblastoma, with evidence supporting biochemical monitoring as the primary surveillance method, reducing reliance on routine imaging (NCCN, 2026).
- Cross-sectional imaging remains necessary for unresected tumors or when AFP levels do not adequately reflect disease burden, supporting selective rather than routine imaging use (NCCN, 2026).
- PET/CT has not demonstrated clinical utility during initial staging, response assessment, or surveillance in hepatoblastoma and should not substitute for biopsy of suspicious lesions (NCCN, 2026).
- Restricting surveillance imaging in AFP-responsive patients minimizes cumulative radiation exposure without compromising outcomes (NCCN, 2026).

Health Equity Considerations

Hepatoblastoma, the most common primary liver malignancy in children, is characterized by marked disparities in incidence, stage at presentation, and outcomes across demographic and socioeconomic groups. Population-based studies demonstrate that hepatoblastoma incidence continues to rise in the United States, with disproportionately higher incidence among male infants and Hispanic children, as well as elevated risk among certain racial and ethnic minority populations (Kahla et al., 2022; Espinoza et al., 2023). Latino children are not only more likely to be diagnosed with hepatoblastoma but also have more than twice the risk of presenting with metastatic disease at diagnosis compared with non-Hispanic White children, a finding with direct prognostic significance given the strong association between metastatic disease and poorer survival (Espinoza et al., 2023). National data further show that non-Hispanic Black children experience significantly worse survival outcomes, even after adjusting for stage and age, suggesting that disparities are not fully explained by disease biology alone and may reflect structural inequities in access to timely diagnosis and high quality care (Kahla et al., 2022). Globally, although overall hepatoblastoma mortality has declined, persistent differences by sex, age, and geographic region underscore continuing inequities in disease burden and early detection, particularly in low resource settings (Chen et al., 2025).

Equitable access to timely, high-quality imaging is central to addressing these disparities, as imaging underpins accurate staging, risk stratification, surgical planning, and assessment of metastatic disease in hepatoblastoma. Delays in diagnosis or incomplete imaging may contribute to advanced stage at presentation, particularly among populations facing barriers related to insurance status, socioeconomic disadvantage, or limited access to specialized pediatric oncology centers (Kahla et al., 2022; Espinoza et al., 2023). Disparities also extend beyond diagnosis to treatment delivery; children who are Black or publicly insured are significantly less likely to undergo potentially curative surgical resection or liver transplantation, independent

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of disease related factors, highlighting inequities in access to definitive therapy that may be compounded by delayed or fragmented diagnostic evaluation (Ziogas et al., 2024). While recent evidence suggests relatively equitable enrollment in Children's Oncology Group clinical trials for hepatoblastoma during periods when trials are widely available, gaps in access to specialty care and advanced imaging may still limit timely referral and optimal management outside of clinical trial settings (Monterroso et al., 2025). Emphasizing prompt diagnostic workup, standardized staging imaging, and early referral to multidisciplinary liver tumor centers may help reduce delays, improve access to curative treatment, and support more equitable outcomes for infants and children with hepatoblastoma across diverse populations (Kahla et al., 2022; Ziogas et al., 2024).

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Pediatric Hepatocellular Carcinoma (HCC) (PEDONC-11.3)

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Criteria

Initial Staging

Indication	Medically Necessary Imaging Study
All individuals with suspected liver tumors	Abdominal ultrasound (CPT® 76700) is considered medically necessary even after MRI or CT imaging in order to allow evaluation for tumor thrombus
Individuals with a liver mass that is a biopsy proven primary liver malignancy or a liver mass that is clinically consistent with a primary liver mass	ANY of the following: • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) ◦ Hepatobiliary specific contrast agents (gadoxetate, gadobenate [MultiHance]) are preferred if available and are considered medically necessary if requested, whether or not a prior gadolinium-enhanced MRI has been previously performed ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) is inferior to MRI for pediatric liver malignancies and is only considered medically necessary if MRI is not available, contraindicated, or sedation is required but not available, or to clarify specific inconclusive areas on MRI • MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) to evaluate vascular invasion

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Indication	Medically Necessary Imaging Study
Initial work-up for all pediatric liver tumors	CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • Should be completed prior to anesthesia exposure if possible
Symptoms suggesting CNS metastases in individuals with HCC	MRI Brain without and with contrast (CPT® 70553)
Initial evaluation of bony metastases in individuals with HCC only with systemic symptoms or bone pain	Nuclear bone scan (See: **Modality General Considerations (PEDONC-1.3)**)
Rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision-making in individuals with HCC	PET/CT (CPT® 78815) • PET/CT is not considered medically necessary in lieu of biopsy of suspicious lesions • Indications and coding for rare circumstances where PET/MRI is medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

Treatment Response

- While the majority of individuals will require abdomen and pelvis imaging at all time points, the pelvis imaging may be omitted at the discretion of the ordering physician

Indication	Medically Necessary Imaging Study
All individuals with HCC	Imaging of any metastatic sites with the same modality used during initial staging

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Indication	Medically Necessary Imaging Study
Individuals with HCC with disease not completely resected at initial diagnosis	Every 2 cycles (~6 weeks) **and** at the end of planned therapy: • CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250) • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) is inferior to MRI for pediatric liver malignancies and is only considered medically necessary if MRI is not available, contraindicated, or sedation is required but not available, or to clarify specific inconclusive areas on MRI • MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) to evaluate vascular invasion
Individuals with HCC if tumor thrombus was detected at initial diagnosis	Abdominal ultrasound (CPT® 76700) • If no tumor thrombus was present, continued ultrasound evaluations are not considered medically necessary without a specific reason documented in the clinical records
Rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision-making in individuals with HCC	PET/CT (CPT® 78815) • Indications and coding for rare circumstances where PET/MRI is medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**

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Surveillance Imaging

Indication	Medically Necessary Imaging Study
All individuals with HCC	Every 3 months for 1 year, then every 6 months for 1 year, then annually for 3 years after completion of all therapy: • MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) • Chest x-ray or CT Chest with contrast (CPT® 71260)

Background and Supporting Information

- Pediatric HCC, including fibrolamellar HCC, primarily affects older children and adolescents and has substantially poorer outcomes than hepatoblastoma, particularly in advanced stages (NCCN, 2026).
- Ultrasound and tumor markers (including AFP) are used for initial evaluation, followed by cross-sectional imaging to assess resectability and metastatic disease (NCCN, 2026).
- Surgical resection remains the primary curative approach when feasible; most pediatric patients do not receive adjuvant therapy after complete resection (NCCN, 2026).

Evidence Discussion

- CT and MRI provide essential anatomic detail for staging and surgical candidacy but do not support routine high-frequency surveillance beyond guideline recommendations (NCCN, 2026).
- Surveillance imaging following complete resection is supported to detect recurrence, but intensity should balance recurrence risk with radiation exposure (NCCN, 2026).
- PET/CT lacks evidence of benefit for surveillance or routine evaluation in pediatric HCC and should not replace histologic confirmation of suspicious findings (NCCN, 2026).
- When brain or skeletal metastases are present, imaging follow-up should mirror the primary site's schedule and modality, ensuring consistency without over-imaging (NCCN, 2026).

Health Equity Considerations

Pediatric HCC is rare but associated with meaningful disparities in outcomes that mirror, and in some cases diverge from, those observed in adults. Population-based analyses demonstrate that while overall pediatric HCC incidence in the United States

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has remained stable, children and adolescents frequently present with advanced disease due to the absence of routine surveillance in most pediatric populations, in contrast to adults with cirrhosis who may undergo screening (Arnett et al., 2025; Guo et al., 2021). Notably, non-Hispanic Black children with HCC experience a significantly higher risk of death compared with non-Hispanic White children, even after adjustment for stage and socioeconomic factors, suggesting that disparities extend beyond tumor burden alone and may reflect inequities in access to specialized care, timely diagnosis, and treatment delivery (Arnett et al., 2025). Geographic inequities are also evident, as pediatric patients diagnosed in smaller metropolitan or non-metropolitan counties have worse survival outcomes than those treated in large urban centers, underscoring the importance of access to high volume, multidisciplinary liver tumor programs (Arnett et al., 2025; Zheng et al., 2026).

Disparities in access to definitive therapy further compound outcome differences in pediatric HCC. Surgical resection or liver transplantation remains the cornerstone of curative treatment, yet national data show that children from racially marginalized groups and those with public or no insurance are less likely to undergo potentially curative liver surgery, even after accounting for disease-related factors (Ziogas et al., 2024). Structural barriers, such as limited access to transplant centers, delays in referral, and differences in institutional resources, may disproportionately affect these children and contribute to worse survival (Guo et al., 2021; Zheng et al., 2026). Although clinical trial participation does not appear to differ substantially by race or socioeconomic status in pediatric liver tumors overall, inequities in diagnostic imaging, staging evaluation, and referral pathways may still limit equitable access to advanced therapies outside of trial settings (Ziogas et al., 2024). Prioritizing timely cross-sectional imaging for accurate staging, early multidisciplinary consultation, and referral to specialized centers may help reduce disparities in treatment access and improve outcomes for children and adolescents with hepatocellular carcinoma (Arnett et al., 2025; Zheng et al., 2026).

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Pediatric Pancreatic Carcinoma (PEDONC-11.4)

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Criteria

- This guideline applies to suspected or diagnosed pancreatic neoplasms in children.
- Beckwith-Wiedemann syndrome increases pancreatoblastoma risk. MEN1, VHL, neurofibromatosis, and tuberous sclerosis are also risk factors for pancreatic endocrine neoplasms.
  - Screening studies in these conditions are found in **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)**.

Indication	Medically Necessary Imaging Study
Initial staging in individuals with pancreatic carcinoma	▪ CT Abdomen and Pelvis with or without and with contrast (CPT® 74177 or CPT® 74178) OR MRI Abdomen without and with contrast plus MRI Pelvis with and without contrast (CPT® 74183 and CPT® 72197) ▪ CT Chest with (CPT® 71260) or without (CPT® 71250) contrast ▪ ^{68}Ga-Dotatate PET/CT whole-body (CPT® 78816) - Exception: for pediatric pancreatic tumor of non-neuroendocrine origin (SPN, pancreatoblastoma and other exocrine origin) with equivocal conventional imaging, FDG PET/CT whole-body or skull to thighs (CPT® 78816 or 78815)
Treatment response ~every 2 cycles during treatment and at the end of planned therapy in individuals with pancreatic carcinoma	▪ CT or MRI as used at time of initial imaging

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Indication	Medically Necessary Imaging Study
If conventional imaging for treatment response is equivocal in individuals with pancreatic carcinoma	▪ Neuroendocrine tumors: ^{68}Ga Dotatate PET/CT skull to thighs or whole-body (CPT® 78815 or 78816) ▪ Non-neuroendocrine tumors: FDG PET/CT skull to thighs or whole-body (CPT® 78815 or 78816)
Assess candidacy for PRRT therapy in individuals with pancreatic carcinoma	▪ ^{68}Ga Dotatate PET/CT whole body CPT® 78816 to assess candidacy for PRRT therapy
Surveillance in individuals with pancreatic carcinoma	▪ MRI or CT, modality and contrast as used in initial imaging, every 3 months for 2 years, then every 4 months for 1 year, then every 6 months for 1 year, then in 12 months to complete 5 years surveillance
Suspected recurrence in individuals with pancreatic carcinoma	▪ Repeat all imaging as noted in initial staging section

Background and Supporting Information

- Pancreatic tumors in children are exceedingly rare and differ biologically from adult pancreatic ductal adenocarcinoma (NCCN, 2026).
- The most frequent pediatric pancreatic tumor is solid pseudopapillary neoplasm, a low-grade epithelial malignancy, followed by pancreatoblastoma (NCCN, 2026).
- Surgical resection is the primary treatment modality, with favorable outcomes for low-grade tumors (NCCN, 2026).

Evidence Discussion

- Cross-sectional imaging is valuable for diagnosis and operative planning but does not support intensive post-treatment surveillance in asymptomatic patients (NCCN, 2026).
- Given low recurrence risk and favorable prognosis for most pediatric pancreatic tumors, limiting surveillance imaging reduces unnecessary radiation and downstream testing (NCCN, 2026).
- There is no evidence supporting PET/CT use in pediatric pancreatic tumors, and its routine use may increase false-positive findings without clinical benefit (NCCN, 2026).

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Health Equity Considerations

Pediatric pancreatic carcinoma is exceedingly rare, and evidence specific to children and adolescents is limited; however, available data suggest that disparities affecting adults with pancreatic cancer likely extend to pediatric populations through shared structural and contextual factors. Pancreatic malignancies are often diagnosed at advanced stages due to nonspecific symptoms and lack of effective screening, making timely access to high quality diagnostic imaging critical for staging and treatment planning (Patel et al., 2025). Social determinants of health including socioeconomic status (SES), insurance coverage, geographic location, race, educational attainment, and health literacy have been consistently associated with delays in diagnosis, lower likelihood of receiving guideline-concordant care, and worse outcomes in pancreatic cancer overall (Patel et al., 2025). In pediatric patients, who already face diagnostic delays due to disease rarity, these structural barriers may further exacerbate inequities in access to timely cross-sectional imaging, subspecialty consultation, and referral to high volume multidisciplinary centers.

Socioeconomic disadvantage and insurance status are particularly influential across the pancreatic cancer care continuum. Lower SES and lack of private insurance are associated with more advanced stage at presentation, reduced access to multimodal therapy, and lower rates of surgical resection, the only potentially curative option for pancreatic carcinoma (Patel et al., 2025). Families experiencing financial insecurity may encounter additional barriers to completing recommended imaging studies, traveling to specialty centers, or maintaining follow up, challenges that can be magnified in pediatric care where caregiver availability and resources are essential. Geographic disparities compound these effects, as patients in rural or underserved areas have less access to high volume centers with pediatric surgical and oncology expertise, which are associated with improved outcomes and more consistent delivery of guideline-based imaging and treatment (Patel et al., 2025).

Racial and ethnic disparities documented in pancreatic cancer also warrant consideration in pediatric populations. In adults, Black and Hispanic patients are more likely to present with advanced disease, experience treatment delays, and receive care at lower volume institutions, even after adjustment for SES and insurance status (Patel et al., 2025). Language barriers and limited health literacy further impede navigation of complex care pathways, contributing to lower rates of guideline-concordant imaging and therapy. While pediatric-specific data are sparse, children from racially and ethnically marginalized communities may be similarly affected by systemic barriers that delay diagnosis and limit access to specialized imaging and multidisciplinary evaluation. Emphasizing early diagnostic imaging, streamlined referral pathways, culturally and linguistically appropriate communication, and access to high volume pediatric centers may help mitigate disparities and promote more equitable outcomes for this rare but aggressive malignancy (Patel et al., 2025).

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Retinoblastoma (PEDONC-12)

Guideline

Retinoblastoma – General Considerations (PEDONC-12.1)
Retinoblastoma – Imaging (PEDONC-12.2)
References (PEDONC-12)

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Retinoblastoma – General Considerations (PEDONC-12.1)

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Criteria

- Detailed evaluation by a physician with significant training and/or experience in retinoblastoma (most commonly a pediatric ophthalmologist or pediatric oncologist) is considered medically necessary prior to considering advanced imaging.
- Whole-body MRI has shown poor sensitivity and specificity in individuals with predisposition to systemic malignancy due to germline RB1 mutations, and is not considered medically necessary.
- Individuals who carry the RB1 mutation also have increased risk of developing other cancers, such as osteosarcoma, soft tissue sarcomas, or melanoma. For more information on heritable retinoblastoma, see: **Familial Retinoblastoma Syndrome (PEDONC-2.12)**.

Background and Supporting Information

- Retinoblastoma is a malignant tumor of the developing retina that occurs almost exclusively in early childhood, with most cases diagnosed before five years of age. Approximately 60% of cases are unilateral and 40% are bilateral, with bilateral disease presenting at a younger mean age than unilateral disease (Lohmann & Gallie, 2023).
- Retinoblastoma develops through biallelic inactivation of the RB1 tumor suppressor gene. Individuals with bilateral retinoblastoma, multifocal disease, trilateral retinoblastoma, or a family history of retinoblastoma are considered at high risk for a germline RB1 pathogenic variant, while most unilateral cases without family history are non-heritable (Lohmann & Gallie, 2023).
- Disease may be unilateral, bilateral, or trilateral, the latter defined by the presence of an associated pinealoblastoma. Trilateral retinoblastoma occurs almost exclusively in individuals with a germline RB1 pathogenic variant (Lohmann & Gallie, 2023).
- Diagnosis is established by ophthalmologic examination of the retina with pupillary dilation, typically confirmed by examination under anesthesia. Biopsy is avoided due to the risk of tumor dissemination beyond the globe (Lohmann & Gallie, 2023).
- Individuals with heritable retinoblastoma have a markedly increased lifetime risk of subsequent malignant neoplasms, particularly following exposure to ionizing radiation. Avoidance of radiation exposure is a central consideration in diagnostic and surveillance imaging (Lohmann & Gallie, 2023).

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Evidence Discussion

- Clinical ophthalmologic examination, particularly examination under anesthesia in young children, is the most sensitive method for detecting intraocular disease and recurrence. Evidence supports prioritizing EUA over routine imaging (Lohmann & Gallie, 2023).
- Survivors of heritable retinoblastoma demonstrate substantially increased rates of secondary malignancies, particularly when exposed to ionizing radiation. Restricting CT and x-ray imaging reduces long-term cancer risk without compromising detection of intraocular disease (Lohmann & Gallie, 2023).
- Imaging is clinically valuable for staging, assessment of extraocular extension, and evaluation of suspected intracranial disease, but routine surveillance imaging has not shown benefit in asymptomatic patients (Lohmann & Gallie, 2023).

Health Equity Considerations

Retinoblastoma is a highly curable pediatric malignancy when detected early, making it a well-recognized tracer cancer for evaluating health system performance and equity in childhood oncology. Despite substantial global improvements in survival and reductions in mortality and disability adjusted life years (DALYs) over the past three decades, the burden of retinoblastoma remains disproportionately concentrated among children in low income and low-sociodemographic index (SDI) regions (Chen et al., 2024; Li et al., 2025; Zhu et al., 2025). Across analyses of Global Burden of Disease 2021 data, children in low SDI settings, particularly in Sub-Saharan Africa and parts of South Asia, continue to experience the highest incidence of advanced disease, mortality, and DALYs, reflecting persistent inequities in early detection, access to diagnostic imaging, and timely treatment (Chen et al., 2024; Li et al., 2025). Delayed presentation due to limited caregiver awareness, insufficient primary screening, and constrained access to ophthalmologic and imaging services often leads to diagnosis at more advanced stages, where treatment is more complex and outcomes are poorer (Zhu et al., 2025).

Socioeconomic status, geographic location, and health system capacity are key drivers of inequities along the retinoblastoma care continuum. Global analyses demonstrate strong negative correlations between SDI and retinoblastoma mortality and DALYs, indicating that children in poorer regions bear a markedly higher disease burden despite the availability of effective treatments (Chen et al., 2024; Li et al., 2025). In low resource settings, shortages of specialized imaging modalities (such as MRI for optic nerve and intracranial assessment), limited access to pediatric ocular oncology expertise, and fragmented referral pathways contribute to diagnostic delays and higher rates of enucleation and metastatic disease (Zhu et al., 2025). These disparities were further exacerbated during the COVID-19 pandemic, which disrupted routine pediatric care, diagnostic imaging, and treatment services, particularly in low and middle income countries, raising concerns about underdiagnosis and long-term survival impacts in vulnerable populations (Zhu et al., 2025).

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Evidence suggests that regions with robust screening programs, universal health coverage, coordinated referral networks, and timely access to diagnostic imaging achieve earlier detection, lower mortality, and substantially reduced DALYs (Chen et al., 2024; Li et al., 2025). Strategies such as standardized imaging protocols, expansion of pediatric ophthalmic imaging capacity, leveraging telemedicine and digital screening tools, and integration with global initiatives like the WHO Global Initiative for Childhood Cancer may help reduce inequities in diagnosis and staging (Li et al., 2025; Zhu et al., 2025). Emphasizing prompt, guideline-concordant imaging regardless of socioeconomic or geographic barriers is critical to ensuring that all children with suspected retinoblastoma have equitable opportunities for early diagnosis, vision preservation, and survival.

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Retinoblastoma – Imaging (PEDONC-12.2)

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Criteria

Initial Staging

- Tumor biopsy is NOT considered medically necessary prior to imaging in individuals with retinoblastoma
- PET is not considered medically necessary in the evaluation of retinoblastoma

Indication	Medically Necessary Imaging Study
Initial work-up of individuals with retinoblastoma	MRI Orbits (CPT® 70543) and Brain (CPT® 70553) without and with contrast • Brain imaging may be omitted or deferred at the discretion of the treating ophthalmologist or oncologist
Evidence of CNS metastasis in individuals with retinoblastoma on: • Ophthalmologic exam • MRI Brain • Lumbar CSF cytology	MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
Clinical symptoms to suggest metastatic disease in individuals with retinoblastoma	CT Chest with contrast (CPT® 71260) and MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and 72197)
Ordered by the treating ophthalmologist for a specified indication in individuals with retinoblastoma	CT Orbital (contrast as requested) and orbital ultrasound
Individuals with retinoblastoma with systemic bone pain suggestive of bony metastases	Nuclear bone scan (See: **Modality General Considerations (PEDONC-1.3)**)

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Treatment Response

Indication	Medically Necessary Imaging Study
All individuals with retinoblastoma	MRI Orbits without and with contrast (CPT® 70543) and/or MRI Brain without and with contrast (CPT® 70553) every 2 cycles (~ every 6 weeks) and at the end of planned therapy
Individuals with retinoblastoma with metastatic disease	Imaging of known positive areas using the same modality as at initial staging every 2 cycles (~6 to 8 weeks) and at the end of planned therapy

Surveillance

Indication	Medically Necessary Imaging Study
Unilateral retinoblastoma	Surveillance using advanced imaging for unilateral retinoblastoma after enucleation or exenteration only for evaluation of specific clinical concerns
Bilateral retinoblastoma or individuals treated with ocular salvage approach	MRI Orbits (CPT® 70543) and Brain (CPT® 70553) for individuals undergoing ocular salvage treatment approaches every 6 months for 2 years following completion of therapy or until the age of 5 years, whichever is later

Background and Supporting Information

- Individuals with germline RB1 pathogenic variants or bilateral disease are at increased risk for pinealoblastoma (Lohmann & Gallie, 2023).

Evidence Discussion

- MRI is the preferred cross-sectional imaging modality in retinoblastoma for evaluation of optic nerve involvement, extraocular extension, and intracranial pathology. MRI avoids ionizing radiation and provides superior soft-tissue characterization compared with CT (Lohmann & Gallie, 2023).
  - MRI may be used to evaluate suspected trilateral retinoblastoma; however, routine MRI screening of the pineal gland is not considered medically necessary for unilateral, non-heritable cases (Lohmann & Gallie, 2023).

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- CT is not recommended for routine evaluation of retinoblastoma, particularly in infants or individuals with suspected heritable disease, due to the increased lifetime risk of radiation-induced malignancy (Lohmann & Gallie, 2023).
- The primary method of surveillance following diagnosis and treatment is serial ophthalmologic examination under anesthesia. Routine cross-sectional imaging does not improve outcomes and increases anesthesia exposure, cost, and potential incidental findings (Lohmann & Gallie, 2023).
- Imaging strategies that minimize radiation and anesthesia exposure are particularly important given the excellent survival rates of retinoblastoma and the long life expectancy of survivors. Restrictive imaging criteria balance diagnostic benefit with long-term harm reduction (Lohmann & Gallie, 2023).

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Pediatric Nasopharyngeal Carcinoma (PEDONC-13)

Guideline

Pediatric Nasopharyngeal Carcinoma – General Considerations (PEDONC-13.1)
Pediatric NPC – Imaging (PEDONC-13.2)
References (PEDONC-13)

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Pediatric Nasopharyngeal Carcinoma – General Considerations (PEDONC-13.1)

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Background and Supporting Information

- Pediatric nasopharyngeal carcinoma (NPC) is a rare epithelial malignancy arising from the nasopharyngeal mucosa and accounts for a minority of head and neck cancers in children and adolescents, with increasing incidence in older adolescents and distinct geographic and racial distributions (NCI, 2024).
- Due to rich lymphatic drainage of the nasopharynx, regional metastases frequently involve cervical and retropharyngeal lymph nodes. Distant metastatic disease most commonly affects bone and lung, with mediastinal and hepatic involvement occurring less frequently (NCI, 2024).
- The most common initial presentation is painless cervical lymphadenopathy. Other presenting symptoms may include nasal obstruction, epistaxis, otitis media, headache, and cranial nerve deficits related to skull base invasion (NCI, 2024).
- Pediatric NPC is strongly associated with Epstein-Barr virus (EBV), and elevated circulating EBV DNA is commonly detected at diagnosis. Pediatric cases are more likely to be nonkeratinizing or undifferentiated histologic subtypes (NCI, 2024).
- Skull base and intracranial extension are common at presentation and are associated with more advanced disease stage. Despite a high frequency of advanced locoregional disease, the incidence of distant metastasis at initial diagnosis is low (NCI, 2024).

Evidence Discussion

- Imaging strategies that define the extent of primary tumor involvement, particularly skull base invasion and nodal disease, provide essential prognostic information and direct appropriate therapy without requiring excessive serial imaging (NCI, 2024).
- Quantitative EBV DNA levels correlate with tumor burden and treatment response, allowing laboratory monitoring to complement imaging and reduce the need for frequent cross-sectional studies (NCI, 2024).
- Most pediatric NPC patients achieve long-term survival, and unnecessary imaging increases cumulative radiation exposure and risk of late effects without demonstrated improvement in outcomes (NCI, 2024).

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Health Equity Considerations

Pediatric NPC is a rare malignancy with a markedly uneven global distribution, making health equity central to timely diagnosis and optimal outcomes. Population-based analyses demonstrate that the burden of pediatric NPC is disproportionately concentrated in specific geographic and sociodemographic settings, particularly in East and Southeast Asia, North Africa, and parts of Sub-Saharan Africa, while remaining rare in most high income Western regions (Lei et al., 2024; Xu et al., 2025). Although global age standardized incidence rates have shown a modest decline over recent decades, children living in low and low middle sociodemographic index (SDI) regions continue to experience relatively higher incidence and delayed diagnosis, driven by population growth, endemic EBV exposure, environmental and dietary risk factors, and limited access to specialized pediatric care and diagnostic imaging (Lei et al., 2024; Xu et al., 2025). These structural inequities contribute to the frequent presentation of locally advanced disease at diagnosis, a pattern that is more pronounced in resource limited settings.

Socioeconomic and geographic disparities also shape access to guideline-concordant imaging, treatment planning, and survivorship care. Limited availability of advanced imaging, particularly high quality MRI for locoregional staging and evaluation of skull base or intracranial extension, can delay diagnosis and compromise accurate risk stratification in lower SDI regions, while improved imaging infrastructure and multidisciplinary oncology care in high SDI regions have contributed to declining incidence and mortality (Lei et al., 2024; Xu et al., 2025). Sex- and age-based differences, with higher incidence in adolescent males, intersect with these broader inequities and may further increase vulnerability to delayed diagnosis and treatment-related morbidity (Lei et al., 2024). Emphasizing timely access to MRI based staging, standardized imaging pathways, and strengthened referral networks to pediatric centers of expertise has the potential to reduce disparities and support earlier diagnosis, treatment de-escalation when appropriate, and improved long-term outcomes regardless of geographic location or socioeconomic status (Xu et al., 2025).

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Pediatric NPC – Imaging (PEDONC-13.2)

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Criteria

Initial Staging

Indication	Medically Necessary Imaging Study
All individuals with NPC	• MRI Brain without and with contrast (CPT® 70553) and MRI Orbit/Face/Neck without and with contrast (CPT® 70543) ◦ CT Head without and with contrast (CPT® 70470), CT Maxillofacial without and with contrast (CPT® 70488), and/or CT Neck with contrast (CPT® 70491) for individuals with documented contraindication to MRI imaging (avoidance of sedation should not be the sole reason • CT Chest with contrast (CPT® 71260)
To evaluate for distant metastases after histologic confirmation in individuals with NPC	• Whole-body PET/CT (CPT® 78816) ◦ Bone scan when PET/CT is unavailable (See: **Modality General Considerations (PEDONC-1.3)**) ◦ Indications and coding for rare circumstances where PET/MRI is medically necessary are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)** ◦ CT Abdomen with contrast (CPT® 74160) for ANY of the following if PET/CT unavailable: ▪ Initial EBV DNA load ≥4000 copies/mL ▪ Signs and symptoms of liver disease (including abdominal pain and elevated LFTs)

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Treatment Response

Indication	Medically Necessary Imaging Study
Response assessment in individuals with NPC at the following time points: • Following completion of neoadjuvant chemotherapy • Following completion of chemoradiotherapy	MRI Brain without and with contrast (CPT® 70553) **and** MRI Neck without and with contrast (CPT® 70543)
Individuals with NPC at the following time points: • Following completion of neoadjuvant chemotherapy only if positive at initial diagnosis • Following completion of chemoradiotherapy	CT Chest with contrast (CPT® 71260) and Whole-Body PET/CT (CPT® 78816) or bone scan (See: **Modality General Considerations (PEDONC-1.3)**)
During active treatment for recurrent pediatric cancer in rare circumstances when results are likely to result in a treatment change, including a change from active treatment to surveillance	PET/CT (CPT® 78816)

Surveillance

Indication	Medically Necessary Imaging Study
All individuals with NPC	Every 3 months for 1 year, then every 6 months for 2 years after completion of all planned therapy: • MRI Brain without and with contrast (CPT® 70553) and MRI Neck without and with contrast (CPT® 70543) • CT Chest with contrast (CPT® 71260)

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Suspected Recurrence

Indication	Medically Necessary Imaging Study
All individuals with NPC	• MRI Brain without and with contrast (CPT® 70553) and MRI Neck without and with contrast (CPT® 70543) ◦ CT Head without and with contrast (CPT® 70470), CT Maxillofacial without and with contrast (CPT® 70488), and/or CT Neck with contrast (CPT® 70491) for individuals with documented contraindication to MRI imaging • CT Chest with contrast (CPT® 71260)
• Individuals with histologically confirmed recurrence of NPC • Clarification of specified inconclusive findings seen on conventional imaging • Restaging to identify sites of disease when EBV PCR levels are abnormally high and conventional imaging is negative	Whole-body PET/CT (CPT® 78816) or bone scan (See: **Modality General Considerations (PEDONC-1.3)**)

Evidence Discussion

- MRI of the head and neck is the preferred modality for evaluating the primary tumor, parapharyngeal extension, skull base involvement, and intracranial spread due to superior soft-tissue contrast (NCI, 2024).
- Imaging of the chest and skeleton may be used at initial staging to assess for metastatic disease; however, fewer than 10% of children present with distant metastases at diagnosis (NCI, 2024).
- Evidence does not support routine PET/CT or bone scan surveillance in asymptomatic pediatric NPC survivors, as relapse is uncommon and typically detected clinically or via site-directed imaging (NCI, 2024).
- Pediatric NPC survivors are at risk for significant late effects due to combined chemotherapy and radiotherapy. Limiting radiation-based imaging reduces cumulative exposure without compromising detection of clinically meaningful recurrence (NCI, 2024).
- Selective imaging prompted by symptoms, abnormal examination findings, or rising EBV DNA levels provides a favorable balance of diagnostic yield and harm reduction (NCI, 2024).

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Pediatric Adrenocortical Carcinoma (PEDONC-14)

Guideline

Pediatric Adrenocortical Carcinoma – General Considerations (PEDONC-14.1)
Pediatric ACC – Imaging (PEDONC-14.2)
References (PEDONC-14)

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Pediatric Adrenocortical Carcinoma – General Considerations (PEDONC-14.1)

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- See: **Li-Fraumeni Syndrome (LFS) (PEDONC-2.2)** and **Beckwith-Wiedemann Syndrome (BWS) (PEDONC-2.4)** for screening recommendations for individuals known to have these syndromes.

Background and Supporting Information

- Pediatric adrenocortical carcinoma (ACC) is a rare malignancy arising from the adrenal cortex, accounting for approximately 0.2%–0.3% of childhood cancers, with an estimated 25 cases diagnosed annually in the United States (NCI, 2025; NCCN, 2025).
- Pediatric ACC is aggressive but biologically distinct from adult ACC, with a spectrum ranging from adenoma to carcinoma and difficulty distinguishing benign from malignant lesions based solely on histology (NCI, 2025; NCCN, 2025).
- Most pediatric ACCs are hormonally functional, and diagnosis is commonly prompted by endocrine manifestations such as virilization, Cushing syndrome, or mixed steroid excess; nonfunctional tumors are uncommon and tend to present later (NCI, 2025; NCCN, 2025).

Evidence Discussion

- Clinical outcomes in pediatric ACC are most strongly associated with completeness of surgical resection rather than frequency of imaging, supporting guideline approaches that prioritize accurate preoperative staging while limiting repetitive imaging when disease is clinically stable (NCI, 2025; NCCN, 2025).
- Because most pediatric ACC tumors secrete hormones, biochemical markers provide sensitive indicators of disease activity and recurrence, reducing the necessity for routine imaging in the absence of clinical or laboratory concern (NCI, 2025; NCCN, 2025).
- The high prevalence of germline TP53 variants in pediatric ACC increases susceptibility to radiation-induced malignancies, supporting conservative imaging strategies that limit cumulative radiation exposure without compromising detection of clinically meaningful disease (NCI, 2025; NCCN, 2025).

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Health Equity Considerations

Pediatric ACC is a rare and aggressive malignancy with substantial global variation in incidence, presentation, and outcomes, making health equity considerations central to diagnostic and imaging guidelines. Although the overall incidence in children is low, ranging from approximately 0.2 to 2 cases per million annually, markedly higher rates occur in specific geographic and genetic clusters, most notably in Southern Brazil due to the high prevalence of germline TP53 p.R337H mutations (Lin et al., 2025; Sandru et al., 2022). Children in these high-risk regions often present at younger ages and with functional tumors, yet outcomes remain closely tied to early detection and access to specialized care. In contrast, in many low and middle income settings, limited awareness, reduced availability of endocrine evaluation, and restricted access to advanced cross-sectional imaging contribute to delayed diagnosis, larger tumor size at presentation, and a higher likelihood of metastatic disease, all of which are associated with poorer survival (Sandru et al., 2022).

Disparities in healthcare infrastructure strongly influence access to guideline-concordant imaging, staging, and longitudinal surveillance for pediatric ACC. Advanced imaging modalities, particularly contrast enhanced CT and MRI for local staging and assessment of vascular invasion, as well as chest imaging for metastatic evaluation, are essential for surgical planning and prognostication but may be inconsistently available outside high resource centers (Lin et al., 2025). Children in underserved regions are also less likely to receive timely genetic testing for hereditary cancer syndromes such as Li-Fraumeni or Beckwith-Wiedemann syndrome, which can guide imaging surveillance strategies and risk-appropriate management for patients and their families (Sandru et al., 2022). Emphasizing standardized staging protocols, early referral to multidisciplinary centers, and integration of imaging with hormonal and genetic evaluation can help mitigate structural disparities and improve the likelihood of complete resection, appropriate use of adjuvant therapy, and long-term survivorship care regardless of geographic or socioeconomic context (Lin et al., 2025; Sandru et al., 2022).

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Pediatric ACC – Imaging (PEDONC-14.2)

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Criteria

- CT Abdomen without and with contrast (CPT® 74170) increases radiation exposure and is not considered medically necessary in a child with an adrenal lesion as washout criteria have not been validated in children.
- Many ACC individuals are treated with surgery alone and do not receive adjuvant therapy. These individuals should be imaged using surveillance guidelines after surgery is completed.

Indication	Medically Necessary Imaging Study
Initial staging in individuals with ACC	• CT Chest without contrast (CPT® 71250) or with (CPT® 71260) contrast • CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) • Nuclear bone scan (see: **PEDONC-1.3** for coding)
• Solitary adrenal mass >4cm on conventional imaging and plans for aggressive surgical resection in individuals with ACC • Inconclusive findings on conventional imaging in individuals with ACC	• FDG PET/CT scan (CPT® 78815)
After complete resection, with no plans for chemotherapy or radiotherapy in individuals with ACC	• See surveillance below

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Indication	Medically Necessary Imaging Study
Restaging, for all unresected primary or metastatic disease on chemotherapy in individuals with ACC	• Every 2 cycles (~6 weeks) during chemotherapy, and following completion of all planned chemotherapy: ◦ CT Chest without contrast (CPT® 71250) or with (CPT® 71260) contrast ◦ CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) • If positive for distant metastases at initial diagnosis: ◦ Nuclear bone scan (see: **PEDONC-1.3** for coding) every 2 cycles (~6 weeks) during chemotherapy and following completion of all planned chemotherapy
Response assessment at the completion of radiotherapy in individuals with ACC	• CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)
Surveillance, individuals with ACC with only localized disease at diagnosis	• Every 3 months for 2 years, then every 6 months for 3 years: ◦ CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)
Surveillance, individuals with metastatic ACC	• Every 3 months for 2 years, then every 6 months for 3 years: ◦ CT Chest without contrast (CPT® 71250) or with (CPT® 71260) contrast ◦ CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)
Recurrence in individuals with ACC	• CT Chest without contrast (CPT® 71250) or with (CPT® 71260) contrast • CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183)

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Indication	Medically Necessary Imaging Study
Suspected bone recurrence in individuals with ACC	• Nuclear bone scan (see: **PEDONC-1.3** for coding)

Evidence Discussion

- Cross-sectional imaging at diagnosis is essential to characterize tumor size, local invasion, vascular involvement, and metastatic disease, which are critical for staging and surgical planning in pediatric ACC (NCI, 2025; NCCN, 2025).
- Contrast-enhanced CT or MRI of the abdomen is used to evaluate the primary adrenal tumor, while chest imaging is performed based on risk for pulmonary metastases. MRI is often favored in children to reduce radiation exposure (NCI, 2025; NCCN, 2025).
- Although FDG PET can identify metabolically active disease, routine PET imaging in asymptomatic pediatric ACC survivors has not been shown to improve survival or recurrence detection and contributes to unnecessary radiation exposure (NCI, 2025; NCCN, 2025).
- Post-treatment imaging is individualized based on stage, resection status, and clinical findings, with emphasis on symptom-directed imaging rather than scheduled routine whole-body studies (NCI, 2025; NCCN, 2025).

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Pediatric Melanoma and Other Skin Cancers (PEDONC-15)

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Pediatric Melanoma and Other Skin Cancers (PEDONC-15)

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Criteria

- Pediatric melanoma staging is assigned using the American Joint Committee on Cancer (AJCC) staging for adult melanoma.
- Imaging guidelines and treatment approaches are consistent with those used for adults with melanoma and other skin cancers, and these individuals should follow the imaging guidelines in section **Melanomas and Other Skin Cancers (ONC-5)** in the Oncology Imaging Guidelines.

Background and Supporting Information

- Melanoma in pediatric and adolescent/young adult populations is uncommon, and the majority of pediatric melanoma cases are localized at diagnosis, with most tumors amenable to complete surgical excision (NCCN, 2026).
- Pediatric melanoma may present diagnostic challenges due to atypical clinical and histopathologic features compared with adult melanoma, contributing to variability in management and the absence of extensive pediatric-specific prospective trial data (NCCN, 2026).
- Basal cell carcinoma and squamous cell carcinoma are extremely rare in children and are typically associated with predisposing factors such as immunosuppression, prior radiation exposure, chemotherapy, genetic syndromes, or photosensitizing medications (NCCN, 2026).
- Children and adolescents with melanoma or other skin cancers may have underlying genetic or environmental risk factors, including cancer predisposition syndromes, prior malignancy, organ transplantation, or chronic immune suppression (NCCN, 2026).

Evidence Discussion

- Imaging has low diagnostic yield in asymptomatic patients with localized melanoma, supporting imaging strategies that avoid routine staging or surveillance imaging in early-stage pediatric disease (NCCN, 2026).
- Imaging is most clinically useful in patients with higher-risk disease features, clinical symptoms, or suspected nodal or distant involvement, supporting selective imaging approaches (NCCN, 2026).

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- The avoidance of unnecessary imaging is particularly important in pediatric populations due to cumulative radiation exposure and limited evidence that routine imaging improves outcomes in low-risk skin cancers (NCCN, 2026).
- Because pediatric non-melanoma skin cancers are rare and usually localized, imaging is generally unnecessary unless there are aggressive features, recurrence, or clinical suspicion of deeper or metastatic disease (NCCN, 2026).

Health Equity Considerations

Pediatric melanoma and other skin cancers are rare but potentially aggressive malignancies in children and adolescents, with well-documented inequities in incidence, stage at diagnosis, and outcomes across racial, ethnic, and socioeconomic groups. Although melanoma is more common among non-Hispanic White children, multiple population-based studies demonstrate that Hispanic and Black children are significantly more likely to present with thicker tumors, regional or distant disease, and worse survival outcomes, reflecting delays in recognition and diagnosis (Ahuja et al., 2024; Hamilton et al., 2016). These disparities are exacerbated by atypical clinical presentations in children, including small, uniformly pigmented or amelanotic lesions that do not meet traditional ABCDE criteria, leading to frequent misdiagnosis or delayed referral, particularly in skin of color (Ahuja et al., 2024; Kuo et al., 2021). Broader sociodemographic factors also contribute to inequities in pediatric skin cancer risk and detection, including reduced access to preventive counseling on sun protection, lower perceived melanoma risk among racial and ethnic minority families, and variable access to dermatologic expertise across regions with differing sociodemographic index levels (Hamilton et al., 2016; Mackenzie et al., 2026).

Disparities in access to timely dermatologic evaluation, diagnostic biopsy, and appropriate imaging further influence outcomes for pediatric melanoma and other skin cancers. Children from lower socioeconomic backgrounds or those insured through public programs are less likely to receive subspecialty dermatology care, advanced staging procedures such as sentinel lymph node biopsy, or consistent follow-up, which may delay appropriate imaging and treatment escalation for higher risk disease (Hamilton et al., 2016; Kuo et al., 2021). Structural barriers, including limited acceptance of Medicaid by dermatology practices, geographic distance from specialized pediatric oncology and dermatology centers, language barriers, and reduced utilization of teledermatology among non-English speaking families, can disproportionately affect minority populations (Kuo et al., 2021). Providers should emphasize culturally responsive education for families and clinicians, heightened suspicion for atypical lesions in all skin types, and standardized pathways to ensure timely imaging, staging, and referral regardless of race, ethnicity, insurance status, or geographic location. Such approaches are essential to reducing avoidable delays in diagnosis and improving outcomes for children with melanoma and other skin cancers across diverse populations (Ahuja et al., 2024; Mackenzie et al., 2026).

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Pediatric Salivary Gland Tumors and Thyroid Tumors (PEDONC-16)

Guideline

Pediatric Salivary Gland Tumors and Thyroid Tumors (PEDONC-16)
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Pediatric Salivary Gland Tumors and Thyroid Tumors (PEDONC-16)

Criteria

Pediatric Salivary Gland Tumors

- American Joint Committee on Cancer (AJCC) staging is used for pediatric as well as adult salivary gland tumors.
- Imaging and treatment guidelines for malignant pediatric salivary gland tumors are consistent with those used for adults with salivary gland tumors, and these individuals should follow the imaging guidelines in section **Salivary Gland Cancers (ONC-4)** in the Oncology Imaging Guidelines.

Pediatric Thyroid Tumors

- Imaging and treatment guidelines for malignant pediatric thyroid tumors are consistent with those used for adults with thyroid tumors, and these individuals should follow the imaging guidelines in section **Thyroid Cancers (ONC-6)** in the Oncology Imaging Guidelines.

Background and Supporting Information

- Pediatric Salivary Gland Tumors
  - Pediatric salivary gland tumors are rare, with the parotid gland being the most common site of origin; tumors of the submandibular, sublingual, and minor salivary glands are less frequent but have a higher likelihood of malignancy (NCCN, 2025).
  - Approximately 75% of pediatric salivary gland tumors are benign, most commonly pleomorphic adenoma; however, malignancy rates are higher in children than in adults (NCCN, 2025).
  - The most common malignant salivary gland tumors in pediatric patients include mucoepidermoid carcinoma, acinic cell carcinoma, and adenoid cystic carcinoma, with tumor grade and histology influencing prognosis and management (NCCN, 2025).
- Pediatric Thyroid Tumors
  - Thyroid carcinoma is the most common endocrine malignancy in children, with differentiated thyroid carcinoma (DTC) accounting for the majority of cases (NCCN, 2025).

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- The most common histologic subtypes of pediatric DTC are papillary thyroid carcinoma, followed by follicular and oncocytic (Hürthle cell) carcinoma; medullary thyroid carcinoma (MTC) represents a smaller but clinically distinct subgroup (NCCN, 2025).
- Pediatric thyroid cancers frequently present with cervical lymph node involvement and, less commonly, pulmonary metastases, yet overall long-term survival remains favorable (NCCN, 2025).
- Risk stratification is based on tumor size, multifocality, extrathyroidal extension, nodal or distant metastases, histologic subtype, and molecular features; these factors guide surgical planning and adjuvant therapy decisions (NCCN, 2025).
- Medullary thyroid carcinoma is frequently associated with germline RET pathogenic variants, and management includes genetic testing, risk-based timing of surgery, and lifelong surveillance (NCCN, 2025).

Evidence Discussion

- Imaging criteria for pediatric salivary gland and thyroid tumors are designed to optimize diagnostic accuracy while minimizing radiation exposure, a critical consideration in children given long-term malignancy risk (NCCN, 2025).
- For salivary gland tumors, cross-sectional imaging (CT or MRI) provides clinically relevant information on tumor margins, deep lobe involvement, nodal disease, and perineural invasion, supporting appropriate surgical planning and reducing the risk of incomplete resection (NCCN, 2025).
- In pediatric thyroid cancer, high-resolution ultrasound is the primary imaging modality for initial staging and surveillance, as it reliably detects thyroid nodules and cervical lymph node metastases without ionizing radiation (NCCN, 2025).
  - Selective use of CT or MRI is supported in cases with suspected locally advanced disease, airway compromise, or mediastinal extension, where ultrasound alone is insufficient (NCCN, 2025).
  - Routine use of advanced imaging in low-risk pediatric thyroid cancer does not improve outcomes and may increase exposure-related harms, supporting a risk-adapted imaging strategy (NCCN, 2025).
  - For intermediate- and high-risk thyroid tumors, imaging that defines the extent of nodal or distant metastases improves surgical planning, supports appropriate use of radioactive iodine, and reduces the likelihood of repeat procedures (NCCN, 2025).
  - In medullary thyroid carcinoma, imaging recommendations combined with genetic risk stratification allow for timely surgical intervention, which is associated with improved biochemical control and reduced recurrence (NCCN, 2025).
- The potential harms of imaging, including radiation exposure, need for sedation, and false-positive findings, are mitigated through guideline-directed indications, reinforcing the balance between diagnostic benefit and patient safety (NCCN, 2025).

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Health Equity Considerations

Pediatric salivary gland tumors and thyroid tumors are rare head and neck malignancies with generally favorable survival; however, substantial inequities exist in incidence patterns, stage at presentation, access to specialty care, and treatment timeliness across racial, ethnic, socioeconomic, and geographic groups. For pediatric thyroid cancer, multiple population-based analyses demonstrate that Hispanic, Black, and other non-White children are more likely to present with larger tumors, higher disease burden, and nodal involvement than non-Hispanic White children, even after controlling for socioeconomic status (SES) (Dream, 2024; Ning et al., 2025; Sharma et al., 2023; Zhao & Wilhelm, 2023). These disparities likely reflect delayed recognition of thyroid nodules, barriers to primary and specialty care access, and differential use of diagnostic imaging and biopsy, particularly in children living in lower income neighborhoods, persistent poverty areas, or medically underserved regions (Ning et al., 2025; Zhao & Wilhelm, 2023). Geographic clustering of pediatric thyroid cancer incidence, with higher rates in the Northeast and lower rates in Southern states, further highlights structural differences in healthcare access, diagnostic intensity, and referral patterns that may influence when and how children receive imaging and definitive evaluation (Ghazy et al., 2026).

Access-related inequities also affect treatment pathways and outcomes. Children with Medicaid insurance or from lower income households frequently travel longer distances to receive thyroid surgery, experience longer wait times from diagnosis to definitive treatment, and have worse long-term survival compared with privately insured peers (Dream, 2024; Zhao & Wilhelm, 2023). Delays in surgical management are associated with increased nodal disease and higher likelihood of adjuvant radioactive iodine exposure, which carries important long-term risks for pediatric patients, including secondary malignancies and chronic health effects (Ning et al., 2025; Zhao & Wilhelm, 2023). Similar equity concerns apply to pediatric salivary gland malignancies, where diagnosis is often delayed due to slow growing, asymptomatic tumors and limited awareness among families and clinicians, particularly in younger children and underserved populations (Coleman et al., 2023). Although overall survival for pediatric major salivary gland cancers exceeds 90%, younger children and those with high stage disease or positive surgical margins experience worse outcomes, emphasizing the need for timely imaging, staging, and referral to experienced multidisciplinary teams (Coleman et al., 2023).

Equity-focused implementation of imaging guidelines for pediatric salivary gland and thyroid tumors should prioritize early and appropriate imaging evaluation for children presenting with concerning neck masses or thyroid abnormalities, irrespective of race, insurance status, or geographic location. Strategies to mitigate disparity include standardized risk-based imaging pathways, improved access to pediatric subspecialty expertise (including telemedicine to reduce travel burdens), culturally and linguistically appropriate patient education, and heightened clinician awareness of atypical presentation patterns in populations historically at risk for delayed diagnosis

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(Dream, 2024; Ghazy et al., 2026; Sharma et al., 2023). Ensuring equitable utilization of high quality imaging for diagnosis, staging, and surveillance is essential to reducing preventable delays in care and improving outcomes for all children with salivary gland and thyroid tumors.

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Pediatric Breast Masses (PEDONC-17)

Guideline

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Pediatric Breast Masses (PEDONC-17)

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Criteria

- Ultrasound (CPT® 76641 and CPT® 76642) is the primary and medically necessary modality used for evaluation of pediatric breast masses.
- MRI has very limited utility in evaluation of pediatric breast masses prior to biopsy but may be considered medically necessary in rare cases for surgical planning when ultrasound is non-diagnostic.
- Pediatric individuals with confirmed breast cancer should be imaged according to section **Breast Cancer (ONC-11)** in the Oncology Imaging Guidelines.

Background and Supporting Information

- Breast masses occur in approximately 2–3% of pediatric and adolescent females, and the clinical presentation, diagnostic approach, and management differ substantially from those in adults due to differences in breast development, tissue density, and malignancy risk (Knaus & Grabowski, 2021).
- Breast malignancy in pediatric patients is exceedingly rare, with an estimated incidence of approximately 0.02% in patients ≤21 years, and most malignant lesions represent metastatic or hematologic disease rather than primary breast carcinoma (Davis et al., 2021; Knaus & Grabowski, 2021).
- Fibroadenoma is the most common pediatric breast lesion, accounting for more than 80–90% of breast masses, and is typically benign, slow-growing, and self-limited (Knaus & Grabowski, 2021; Sanders et al., 2018).
- The American College of Radiology BI-RADS classification system, developed and validated in adults, has not been validated in children and may not accurately reflect malignancy risk when applied to pediatric patients (Davis et al., 2021; Knaus & Grabowski, 2021).
  - Large cohort analyses show that application of BI-RADS categories in pediatric patients significantly overestimates cancer risk, frequently assigning BI-RADS 4 or 5 to lesions that are histologically benign, leading to unnecessary biopsies and procedures (Davis et al., 2021; Knaus & Grabowski, 2021).

Evidence Discussion

- Multiple retrospective series demonstrate that routine advanced imaging or invasive evaluation of pediatric breast masses yields extremely low rates of malignancy, supporting conservative imaging approaches in low-risk patients (Davis et al., 2021; Sanders et al., 2018).

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- Ultrasound is the primary and preferred imaging modality for evaluating pediatric breast masses due to its lack of ionizing radiation and its ability to characterize lesions in dense developing breast tissue (Knaus & Grabowski, 2021; Sanders et al., 2018).
- Mammography is not recommended for routine evaluation of pediatric breast masses, as its sensitivity is limited by dense fibroglandular tissue and the radiation exposure outweighs potential diagnostic benefit in this low-risk population (Knaus & Grabowski, 2021; Davis et al., 2021).
- Observational management of small, benign-appearing breast masses has been shown to be safe, with no increase in missed malignancies, and reduces procedural complications, cost, and psychosocial distress (Sanders et al., 2018; Knaus & Grabowski, 2021).
- Core needle biopsy, while safe when indicated, should be reserved for lesions with concerning clinical features or high-risk history, as overuse may lead to unnecessary intervention in the setting of overwhelmingly benign pathology (Sanders et al., 2018; Davis et al., 2021).

Health Equity Considerations

Pediatric and adolescent breast masses are common clinical findings, most frequently representing benign conditions such as fibroadenomas, and breast malignancy in this population is exceedingly rare. Despite these reassuring epidemiologic features, breast masses can cause significant anxiety for patients and families and prompt diagnostic imaging, biopsy, or surgical intervention. Evidence from a multi-institutional cohort of pediatric patients undergoing excision of breast masses demonstrates that, within academic pediatric centers, most aspects of care, including lesion size at presentation, pathology, and time from initial imaging to surgery, do not differ significantly by race/ethnicity, insurance status, neighborhood income, or urbanicity (Knaus et al., 2022). These findings suggest a relatively equitable pathway to definitive surgical management once pediatric patients enter specialized care. However, disparities in clinical presentation were noted, including higher rates of pain at presentation among non-Hispanic Black patients, which may influence initial clinical decision making and family perceptions of urgency (Knaus et al., 2022).

Importantly, the same study identified a significant disparity in preoperative diagnostic practices; non-Hispanic White patients were substantially more likely to undergo preoperative fine needle aspiration or core needle biopsy compared with non-Hispanic Black patients, even after adjusting for lesion size and other clinical factors (Knaus et al., 2022). Although biopsy did not alter time to surgery or final pathology, this variation highlights potential inequities in diagnostic intensity, differences in provider or family preferences, and uneven exposure to additional procedures that may increase cost, discomfort, or anxiety without clear benefit in the pediatric population. Given growing evidence that most pediatric breast masses can be safely evaluated with targeted

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ultrasound surveillance and that routine biopsy may represent overtreatment, providers should emphasize standardized, evidence-based imaging algorithms and shared decision making that are consistently applied across patient populations (Knaus et al., 2022). Ensuring that imaging and diagnostic strategies minimize unnecessary interventions while remaining accessible and culturally responsive is essential to promoting equitable, high value care for children and adolescents presenting with breast masses.

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Histiocytic Disorders (PEDONC-18)

Guideline

Histiocytic Disorders – General Considerations (PEDONC-18.1)
Langerhans Cell Histiocytosis (LCH) (PEDONC-18.2)
Hemophagocytic Lymphohistiocytosis (HLH) (PEDONC-18.3)
Non-Langerhans Cell Histiocytoses (PEDONC-18.4)
References (PEDONC-18)

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Histiocytic Disorders – General Considerations (PEDONC-18.1)

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Criteria

- The Non-Langerhans cell histiocytoses encompass a variety of diseases and have limited imaging considerations except as specified later in this section.
- Where there are indications for PET/CT in these guidelines, please note that indications and coding for rare circumstances where PET/MRI may be approved are found in **PET Imaging in Pediatric Oncology (PEDONC-1.4)**
- PEDONC-18 applies to individuals of all ages.
- The use of PET in this guideline refers to Fluorodeoxyglucose (fluorine-18-2-fluoro-2-deoxy-D-glucose [FDG]) radiotracer only.

Background and Supporting Information

- Histiocytic disorders are rare hematologic neoplasms characterized by accumulation of clonal myeloid-derived histiocytes with associated inflammatory infiltrate, accounting for <1% of soft tissue and lymph node malignancies (NCCN, 2026).
- These disorders demonstrate marked clinical heterogeneity, ranging from localized indolent disease to disseminated multisystem involvement affecting bone, skin, lymph nodes, liver, spleen, lung, bone marrow, endocrine organs, and the central nervous system (NCCN, 2026).
- Contemporary classification has evolved beyond the traditional Langerhans versus non-Langerhans distinction and now reflects integrated clinical, radiographic, histologic, and molecular features, including grouping into Langerhans-related, cutaneous/mucocutaneous, malignant histiocytoses, RDD, and hemophagocytic syndromes (NCCN, 2026).
- Many histiocytic neoplasms share recurrent activating mutations in the MAPK signaling pathway (e.g., BRAF, MAP2K1/2, KRAS, NRAS, ARAF), supporting their classification as clonal neoplastic disorders with shared biologic mechanisms (NCCN, 2026).

Evidence Discussion

- Imaging is essential for initial characterization of disease extent and detection of multisystem involvement, particularly because histiocytic neoplasms often involve multiple organ systems with variable clinical presentation. Imaging findings are frequently nonspecific and overlap with inflammatory, infectious, and neoplastic

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processes, requiring correlation with clinical presentation, pathology, and molecular testing for accurate diagnosis (NCCN, 2026).

- Evidence supports risk-adapted imaging based on clinical presentation, organ involvement, and disease phase, rather than uniform surveillance imaging across all patients, due to lack of outcome benefit in low-risk or asymptomatic disease (NCCN, 2026).
- Limiting advanced imaging to circumstances where results impact management decisions (e.g., staging, treatment response, suspected progression) reduces unnecessary radiation exposure, incidental findings, and downstream interventions. Over-utilization of imaging, particularly serial whole-body studies, may increase radiation burden and false-positive findings without improving clinical outcomes, supporting selective imaging strategies reflected in guideline criteria (NCCN, 2026).

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Langerhans Cell Histiocytosis (LCH) (PEDONC-18.2)

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Criteria

- This guideline may be used for all ages of individuals.

Initial Imaging

Indication	Medically Necessary Imaging Study
Individuals with LCH	Whole-body PET/CT (CPT® 78816) • Whole-body Tc-99m bone scan (CPT® 78306) if PET is unavailable
Suspected pulmonary LCH based on ANY of the following: • Abnormal CXR • Symptoms of pulmonary involvement and normal CXR • Clarification of pulmonary findings on PET/CT	In addition to PET/CT (CPT® 78816), CT Chest with contrast (CPT® 71260) or high-resolution CT Chest without contrast (CPT® 71250)
Individuals with LCH with ANY of the following: • Headaches or visual or neurologic disturbances • Polyuria/polydipsia or other endocrine abnormalities • Skull or craniofacial (including jaw) bone involvement • Otorrhea or hearing loss (CT Temporal Bone may be substituted if requested) • Other signs or symptoms suggesting intracranial involvement, including neurodegeneration syndrome	MRI Brain without and with contrast (CPT® 70553)
Operative planning or image guidance	CTA/MRA Head (CPT® 70496/70544)

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Indication	Medically Necessary Imaging Study
Individuals with LCH with ANY of the following: • Abdominal and/or pelvic signs and symptoms if PET/CT has not been performed or to clarify abnormal abdominal/pelvic findings on PET/CT • Abdominal and/or pelvic findings on ultrasound if PET/CT has not been performed	CT Abdomen and/or Pelvis with contrast (CPT® 74177, 74160, 72193)
Individuals with LCH with ANY of the following: • Elevated liver function tests (usually >5X upper limit of normal) • Abnormalities seen on abdominal ultrasound or CT	MRI Abdomen without and with contrast (CPT® 74183)
Individuals with LCH with ANY of the following: • Vertebral lesions seen on skeletal survey • Clinical symptoms (including back pain) suggesting spinal involvement and negative skeletal survey	MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)

Treatment Response

Indication	Medically Necessary Imaging Study
For simultaneous treatment response evaluation with specific documentation showing that both are necessary (i.e., not for purpose of acquiring a PET/MRI) in individuals with LCH	Both PET/CT (CPT® 78816) and CT with contrast or MRI without and with contrast

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Indication	Medically Necessary Imaging Study
Restaging for all individuals with LCH	CT and/or MRI and/or PET/CT (CPT® 78816) (use modality that showed disease at initial diagnosis) • After 6-8 weeks of initial therapy • At completion of therapy (approximately 12 weeks) for individuals with persistent disease at 6-8 weeks of initial therapy • After surgical curettage (CT or MRI of involved area, not repeat PET) • After radiation therapy
Following initial phase therapy in individuals with LCH	• Treatment response evaluation of involved sites with CT with contrast or MRI with and without contrast every ~3 months while receiving active treatment and at completion of therapy. ◦ PET/CT (CPT® 78816) for inconclusive conventional imaging, if disease was previously only measured/measurable on PET/CT, or for change from active treatment to surveillance ◦ Shorter interval imaging for documented signs or symptoms concerning for disease progression

Surveillance

- Surveillance imaging is determined by areas of disease involvement.
- Individuals with lung, CNS, spleen, bone marrow, and/or liver involvement warrant site-specific diagnostic imaging in addition to PET/CT as outlined below

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Indication	Medically Necessary Imaging Study
Bone involvement in individuals with LCH	• Single site bone disease ◦ Every 3 months for 1 year after completion of therapy: ▪ PET/CT (CPT® 78815 or 78816) **OR** ▪ CT or MRI contrast as requested of involved bony areas • Multifocal bone disease ◦ Every 3 months for 2 years, then no more than annually: ▪ PET/CT (CPT® 78815 or 78816) **OR** ▪ CT or MRI contrast as requested of involved bony areas • Skull or craniofacial (including jaw) bone involvement should be imaged according to CNS involvement section below
Pulmonary involvement in individuals with LCH	• CT Chest with (CPT® 71260) or without contrast (CPT® 71250) at 3 months and 6 months post-completion of therapy to complete 2 years of off-therapy surveillance for any of the following: ◦ Individuals with a history of pulmonary involvement ◦ Individuals with new respiratory or chest symptoms ◦ New findings on CXR **AND** • PET/CT (CPT® 78815 or 78816) at 3 months and 6 months post-completion of therapy, then every 6 months to complete 2 years of off-therapy surveillance, then no more than annually

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Indication	Medically Necessary Imaging Study
CNS involvement in individuals with LCH	• PET/CT (CPT® 78815 or 78816) at 3 months and 6 months post-completion of therapy, then every 6 months to complete 2 years of off-therapy surveillance, then no more than annually **AND** • MRI Brain without and with contrast (CPT® 70553) at 6 weeks, and then every 3 months for 2 years after completion of all therapy for previously documented measurable intracranial lesions ◦ If negative after two years, MRI Brain without and with contrast (CPT® 70553) at 4, 7, and 10 years after completion of all planned therapy • MRI Brain without and with contrast (CPT® 70553) for documented hypothalamic-pituitary dysfunction every 6 months for 2 years and at 4, 7, and 10 years after completion of all planned therapy ◦ MRI at any time for worsening neurologic symptoms • Intraspinal lesions imaged according to the same timeframes as brain imaging using MRI without and with contrast of all involved spine levels

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Indication	Medically Necessary Imaging Study
Liver and/or spleen involvement in individuals with LCH	• For individuals with a history of liver and/or spleen involvement, ONE of the following is considered medically necessary at 3 months and 6 months post-completion of therapy, then every 6 months to complete 2 years of off-therapy surveillance: ◦ Ultrasound Abdomen (CPT® 76700) ◦ CT Abdomen with contrast (CPT® 74160) ◦ MRI Abdomen without and with contrast (CPT® 74183) **AND** • PET/CT (CPT® 78815 or 78816) at 3 months and 6 months post-completion of therapy, then every 6 months to complete 2 years of off-therapy surveillance
Bone marrow involvement in individuals with LCH	PET/CT (CPT® 78815 or 78816) every 3 months for 2 years, then no more than annually
Suspected recurrence or inconclusive findings on any surveillance imaging in individuals with LCH	All imaging studies considered medically necessary for initial workup including whole-body PET/CT (CPT® 78816)

Background and Supporting Information

- LCH represents the most common histiocytic disorder in children and encompasses a spectrum of disease previously described as histiocytosis X, eosinophilic granuloma, Letterer-Siwe disease, and Hand-Schüller-Christian disease (NCCN, 2026).
- Clinical presentation ranges from single-site bone or skin disease to multisystem disease with involvement of risk organs, including liver, spleen, bone marrow, and CNS (NCCN, 2026).
- Common sites of involvement include bone, skin, pituitary gland, liver, spleen, lung, lymph nodes, and CNS, with skull base or facial bone lesions conferring increased risk for CNS involvement (NCCN, 2026).
- Approximately 50% of pediatric cases harbor BRAF V600E mutations, which are associated with multisystem disease, increased recurrence risk, and neurodegenerative CNS involvement (NCCN, 2026).

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Evidence Discussion

- Evidence supports the use of imaging to establish baseline disease distribution, assess treatment response, and identify reactivation or progression, particularly in patients with multisystem or CNS-risk disease (NCCN, 2026).
- In localized or single-system LCH, studies summarized by NCCN show that observation or limited local imaging is often sufficient, avoiding unnecessary radiation exposure while maintaining excellent outcomes (NCCN, 2026).
- For multisystem or CNS-risk LCH, selective use of FDG-PET/CT, MRI, or organ-specific cross-sectional imaging improves detection of occult disease and guides therapy, with benefits outweighing imaging-related risks in these higher-risk populations (NCCN, 2026).
- Extended or intensive imaging surveillance is considered medially necessary only in subsets such as CNS-involved or recurrent LCH, where relapse rates are higher and imaging findings can precede clinical deterioration (NCCN, 2026).

Health Equity Considerations

LCH is a rare but highly heterogeneous pediatric disease that can range from self limited single system involvement to aggressive multisystem disease with significant morbidity and mortality. This clinical variability creates inherent equity challenges, as timely recognition, comprehensive imaging evaluation, and access to specialized multidisciplinary care are critical determinants of outcome. High-risk multisystem LCH disproportionately affects very young children and is strongly associated with oncogenic mutations such as BRAF p.V600E, which correlate with more aggressive disease, higher relapse rates, and resistance to conventional therapy (Mutti& Picarsic, 2025). Delays in diagnosis or incomplete staging, particularly failure to identify risk organ involvement (liver, spleen, bone marrow) orCNS-risk lesions, may worsen long-term outcomes and exacerbate disparities for patients with limited access to pediatric subspecialty imaging and molecular diagnostics (Mutti& Picarsic, 2025).

Equitable implementation of imaging guidelines for LCH requires consistent access to high quality, age-appropriate imaging across care settings, including whole body skeletal surveys, targeted MRI for CNS risk and neurodegenerative disease, and longitudinal imaging for disease surveillance and treatment response. The evolving role of molecular testing, such as sensitive detection of circulating BRAF p.V600E as a prognostic biomarker, introduces additional equity considerations, as these advanced assays may be less available in resource-limited institutions (Mutti& Picarsic, 2025). Imaging pathways should therefore emphasize standardized baseline and follow-up assessments that do not rely solely on advanced technologies to ensure early detection of high risk features. Incorporating clear criteria for imaging escalation, minimizing unnecessary invasive procedures, and facilitating referral to centers with histiocytosis expertise can help reduce disparities and support equitable outcomes for children with LCH across diverse healthcare environments (Mutti& Picarsic, 2025).

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Hemophagocytic Lymphohistiocytosis (HLH) (PEDONC-18.3)

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Criteria

Indication	Medically Necessary Imaging Study
Initial evaluation of HLH	As imaging for this condition is usually done on an urgent basis, ANY or ALL of the following are considered medically necessary: • Ultrasound Abdomen (CPT® 76700) • MRI Abdomen (CPT® 74183) and/or Pelvis (CPT® 72197) without and with contrast • Chest x-ray • CT Chest with contrast (CPT® 71260) • MRI Brain without and with contrast (CPT® 70553) • CTA/MRA Head (CPT® 70496/CPT® 70544) for operative planning or image guidance • CT Sinus without or with contrast (CPT® 70486 or CPT® 70487) if clinical suspicion for sinus disease
If conventional imaging has been completed in individuals with HLH and is unrevealing	Whole-body PET/CT (CPT® 78816) for the purpose of identifying a site for tissue diagnosis of a primary source of infection or malignancy • If a malignancy is identified as the inciting factor for HLH, additional imaging decisions for that malignancy should be based on the appropriate diagnosis-specific guidelines

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Background and Supporting Information

- HLH is a hyperinflammatory syndrome driven by uncontrolled immune activation rather than a primary neoplastic histiocytic proliferation (NCCN, 2026).
- Diagnosis is primarily based on clinical features, laboratory abnormalities, and bone marrow or tissue evaluation, rather than imaging findings (NCCN, 2026).
- Organ dysfunction commonly affects the liver, spleen, bone marrow, lungs, kidneys, and CNS, which may necessitate targeted imaging for evaluation of complications (NCCN, 2026).

Evidence Discussion

- There is no established standard role for routine advanced imaging in the diagnosis or baseline evaluation of HLH, as imaging does not supplant clinical or laboratory criteria (NCCN, 2026).
- NCCN-supported evidence emphasizes that imaging should be problem-focused, used to evaluate suspected organ dysfunction or complications (e.g., CNS involvement, pulmonary compromise), rather than performed in a stepwise or routine surveillance fashion (NCCN, 2026).
- Use of PET/CT is limited to specific scenarios such as identifying occult malignancy or infection when conventional evaluation is inconclusive, balancing diagnostic yield with radiation exposure (NCCN, 2026).
- Avoiding routine PET or serial cross-sectional imaging in HLH reduces exposure to radiation and sedation while maintaining diagnostic accuracy, particularly important in acutely ill pediatric patients who may deteriorate rapidly (NCCN, 2026).

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Non-Langerhans Cell Histiocytoses (PEDONC-18.4)

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Criteria

Juvenile Xanthogranuloma (JXG)

- PET may be considered on a case-by-case basis to evaluate for suspected disease in a particular area despite negative or inconclusive MRI and for treatment response in individuals for whom PET was required to assess extent of disease at diagnosis.

Indication	Medically Necessary Imaging Study
Skin and/or cervical nodes in individuals with JXG	CT with contrast of appropriate area
Systemic JXG with multi-organ involvement	• MRI Brain (CPT® 70553) and/or Orbits (CPT® 70543) without and with contrast • CT Neck (CPT® 70491), Chest (CPT® 71260), and/or Abdomen (CPT® 74160) with contrast • CTA/MRA Head (CPT® 70496/CPT® 70544) as part of operative planning or image guidance

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Rosai-Dorfman Disease (RDD)

Indication	Medically Necessary Imaging Study
Initial imaging in individuals with RDD	• MRI Brain (CPT® 70553) and/or Orbits (CPT® 70543) without and with contrast • CTA/MRA Head (CPT® 70496/CPT® 70544) for operative planning or image guidance • CT Neck (CPT® 70491), Chest (CPT® 71260) and/or Abdomen/Pelvis (CPT® 74177) with contrast if **PET/CT not performed** or to follow up unclear findings in said body areas on PET/CT • CT Sinus without or with contrast (CPT® 70486 or CPT® 70487) if clinical suspicion for sinus disease and **PET/CT not performed** or to follow up unclear sinus findings on PET/CT • Whole-body PET/CT (CPT® 78816) after histologic confirmation of diagnosis
Treatment response in individuals with RDD	Treatment response imaging after 2-3 cycles of systemic therapy during active treatment using any modalities showing disease at diagnosis, including PET/CT • Once PET/CT is negative, conventional imaging every 2-3 cycles and/or at the end of chemotherapy and/or radiation and/or after surgical resection for subsequent restaging. One additional PET/CT is medically necessary at completion of therapy.

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Indication	Medically Necessary Imaging Study
Surveillance in individuals with RDD	PET/CT (CPT® 78816) every 3 months until stabilization of disease (two PET/CT with stable disease status) • Further surveillance imaging of single-site bone disease: ◦ Every 6 months using any modalities showing disease at initial diagnosis (excluding PET/CT) for 1 year ◦ PET/CT is not considered medically necessary for routine surveillance of RDD but is considered medically necessary if conventional imaging is inconclusive for suspected recurrence • Further surveillance imaging of multifocal bone disease: ◦ Every 6 months using any modalities showing disease at initial diagnosis (excluding PET/CT) thereafter ◦ PET/CT is not considered medically necessary for routine surveillance of RDD but is considered medically necessary if conventional imaging is inconclusive for suspected recurrence

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Erdheim-Chester Disease (ECD)

Indication	Medically Necessary Imaging Study
Initial imaging in individuals with ECD	• PET/CT Whole Body (CPT® 78816) ◦ Nuclear bone scan (See: **PEDONC-1.3: Modality General Considerations**) in lieu of PET if requested • MRI Brain without and with contrast (CPT® 70553) and/or MRI Orbits (CPT® 70543) without and with contrast for CNS symptoms, including diabetes insipidus • CTA/MRA Head (CPT® 70496/70544) for operative planning or image guidance • CT Neck (CPT® 70491), Chest (CPT® 71260) and/or Abdomen/Pelvis (CPT® 74177) with contrast **if PET/CT not performed** or if inconclusive findings in said body area on PET/CT • Cardiac MRI without and with contrast (CPT® 75561) for clinically suspected cardiac involvement ◦ If Cardiac MRI is not available, CT Chest with contrast (CPT® 71260) and/or Echocardiogram (TTE) (CPT® 93306, 93307, or 93308) • CT Sinus without or with contrast (CPT® 70486 or CPT® 70487) if clinical suspicion for sinus disease **if PET/CT not performed** or inconclusive sinus findings on PET/CT

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Indication	Medically Necessary Imaging Study
Treatment response in individuals with ECD	• Treatment response imaging every 3 months during active treatment using any modalities showing disease at initial diagnosis, including PET/CT • Once PET/CT shows no remaining FDG-avid lesions, additional PET imaging is only considered medically necessary when conventional imaging studies are inconclusive and acute treatment decisions will be made based on PET results
Surveillance in individuals with ECD	• CT **and/or** MRI **and/or** Nuclear bone scan **and/or** CTA **and/or** MRA **and/or** Cardiac MRI (if modality showed disease at initial diagnosis) every 3 months until the first year after completion of treatment and then every 6 months • PET/CT (CPT® 78816) if conventional imaging is inconclusive for suspected recurrence

Background and Supporting Information

- Non-Langerhans histiocytoses include juvenile xanthogranuloma (JXG), Rosai-Dorfman disease (RDD), and Erdheim-Chester disease (ECD), each with distinct clinical behavior and imaging requirements (NCCN, 2026).
- JXG is typically a benign, self-limited cutaneous disorder in children, often regressing spontaneously without systemic involvement (NCCN, 2026).
- RDD classically presents with bulky lymphadenopathy, frequently cervical, and may include extranodal disease affecting soft tissue, bone, or CNS (NCCN, 2026).
- ECD is an aggressive multisystem histiocytic neoplasm, characterized by long bone involvement and frequent spread to cardiovascular, retroperitoneal, pulmonary, and CNS structures (NCCN, 2026).

Evidence Discussion

- For JXG and uncomplicated RDD, evidence supports limited or no routine advanced imaging in asymptomatic patients, as outcomes are excellent and imaging rarely alters management (NCCN, 2026).

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- In RDD with symptomatic or extranodal involvement, targeted imaging is beneficial for defining disease burden and guiding therapy, while routine long-term surveillance imaging in asymptomatic patients provides minimal added benefit (NCCN, 2026).
- In ECD, robust evidence summarized by NCCN supports systemic imaging for staging and treatment response, particularly using FDG-PET/CT early in therapy; however, once metabolic remission is achieved, routine repeat PET imaging is not considered medically necessary unless results will directly influence management decisions (NCCN, 2026).
- This risk-adapted imaging approach minimizes cumulative radiation exposure while preserving the ability to detect clinically meaningful progression in aggressive non-Langerhans histiocytoses (NCCN, 2026).

Health Equity Considerations

Non-Langerhans cell histiocytoses (non LCH), including juvenile xanthogranuloma (JXG), Rosai Dorfman disease (RDD), and Erdheim Chester disease (ECD), encompass a spectrum of rare disorders with widely variable clinical behavior, ranging from self limited cutaneous disease to progressive, multisystem involvement with long-term morbidity. Equity challenges arise from the rarity and phenotypic overlap of these conditions, which frequently leads to delayed or incorrect diagnoses, particularly outside of specialized centers. Pediatric ECD is especially vulnerable to diagnostic delay due to its pathologic similarity to systemic JXG and mixed ECD/LCH presentations, as well as its historically adult-centric disease profile (Pegoraro et al., 2023; Mutti & Picarsic, 2025). Missed or delayed recognition can postpone appropriate whole body imaging and molecular characterization, increasing the risk of irreversible organ damage, including central nervous system, endocrine, renal, and orbital complications that disproportionately impact long-term quality of life in children (Pegoraro et al., 2023).

Population-based data further suggest that disparities in case identification and access to specialized imaging and molecular diagnostics may exist across racial, ethnic, and socioeconomic groups. Recent U.S. registry analyses demonstrate higher reported incidence rates of ECD among non-Hispanic Black, Hispanic, and Asian or Pacific Islander individuals, yet also highlight potential underrepresentation of lower income populations, likely reflecting barriers to advanced imaging, biopsy logistics, and subspecialty referral rather than true disease prevalence (Tessier et al., 2026). Because non-LCH disorders often require multimodality imaging, such as MRI for CNS and pituitary involvement, CT or PET for systemic disease mapping, and longitudinal surveillance, equitable imaging guidelines should emphasize standardized indications for comprehensive staging regardless of initial biopsy site or apparent disease localization. Clear guidance on when to pursue whole body imaging and referral to histiocytosis expertise centers is essential to reduce diagnostic inequities, avoid fragmented care, and ensure that children with non-LCH histiocytoses receive timely,

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consistent, and high-quality evaluation across diverse healthcare settings (Mutti & Picarsic, 2025; Pegoraro et al., 2023; Tessier et al., 2026).

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Long Term Pediatric Cancer Survivors (PEDONC-19)

Guideline

Long Term Pediatric Cancer Survivors – General Considerations (PEDONC-19.1)
Cardiotoxicity and Echocardiography (PEDONC-19.2)
Second Malignant Neoplasms (SMN) (PEDONC-19.3)
Osteonecrosis in Long Term Cancer Survivors (PEDONC-19.4)
CNS Vascular Changes in Pediatric Cancer Survivors Following CNS Radiation (PEDONC-19.5)
References (PEDONC-19)

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Long Term Pediatric Cancer Survivors – General Considerations (PEDONC-19.1)

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Criteria

- This section applies to individuals who have passed the end of the surveillance imaging period for their specific cancer, or 5 years after completion of therapy, whichever occurs first.
- As these are long-term survivors, many individuals falling under this guideline section will have reached adult age. However, these guidelines relate specifically to late effects of childhood cancer treatment and should be applied to all long-term childhood cancer survivors regardless of current age.
- The Children's Oncology Group has published comprehensive guidelines for the management of long-term childhood cancer survivors, and these are available at: http://www.survivorshipguidelines.org.
- A summary of cancer treatment should be available for all individuals in this category and should generally include, at minimum:
  - type of cancer and stage
  - dates of diagnosis, recurrence, cancer-related surgeries, beginning and end dates of chemotherapy, radiotherapy, and/or stem cell transplant
  - protocol number used for treatment and cumulative chemotherapy drug dose exposures
  - cumulative radiation dose, fraction number, modality, and field exposure
- Annual detailed history and complete physical examination is a critical component of cancer survivorship care and along with laboratory testing serves as the primary method of screening for the majority of late effects.
- Advanced imaging for asymptomatic screening is not routinely considered medically necessary except as specified in this section.
- Imaging requests related to new clinical signs or symptoms in a long term cancer survivor not explicitly covered in this section should be reviewed according to the guideline for the individual's cancer type or the relevant non-malignant clinical problem.

Background and Supporting Information

- Advances in pediatric oncology have resulted in a growing population of long-term childhood cancer survivors, many of whom experience late effects related to prior

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chemotherapy, radiation therapy, surgery, and transplant exposures (Bashore & Hobbie, 2021; Chow et al., 2025).
- Late effects may involve cardiovascular, musculoskeletal, endocrine, neurologic, and oncologic systems, often emerging years to decades after completion of therapy (Vrooman et al., 2018; Chow et al., 2025).
- Survivorship care is guided by risk-based follow-up models, most notably the Children's Oncology Group Long-Term Follow-Up Guidelines, which tailor surveillance intensity to treatment exposures and patient-specific risk factors (Children's Oncology Group, 2023).

Evidence Discussion

- Cohort studies and guideline reviews consistently demonstrate that targeted surveillance improves early detection of clinically significant late effects, including cardiomyopathy, second malignant neoplasms, osteonecrosis, and cerebrovascular disease (Chow et al., 2025; Weil et al., 2023).
- Conversely, routine imaging of asymptomatic survivors without defined risk factors has not shown clear outcome benefit and may increase radiation exposure, incidental findings, anxiety, and downstream testing (Bashore & Hobbie, 2021; Chavhan et al., 2016).
- Evidence supports a balanced, risk-stratified imaging approach, aligning imaging frequency and modality with known late-effect risks rather than uniform lifelong surveillance (Children's Oncology Group, 2023; Chow et al., 2025).

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Cardiotoxicity and Echocardiography (PEDONC-19.2)

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Criteria

- Screening echocardiography (CPT® 93306, CPT® 93307, or CPT® 93308) is considered medically necessary for life after exposure to anthracycline chemotherapy, cardiotoxic immunotherapy, or cardiac exposure to radiotherapy

MEDICALLY NECESSARY SCREENING ECHOCARDIOGRAM INDICATIONS			
Age at Time of Exposure	**Cumulative Doxorubicin Equivalent Dose**	**Cumulative Radiation Dose to Cardiac Muscle**	**Echocardiogram Frequency**
All ages	None	None	None
0-0.99 years	≥250 mg/m2	None	Annual
	0-249 mg/m2	Any dose	Annual
	0-249 mg/m2	None	Every 2 years
1-4.99 years	≥250 mg/m2	Any dose	Annual
	0-249 mg/m2	15+ Gy	Annual
		0-14.99 Gy	Every 2 years
	None	35+ Gy	Annual
		15-34.99 Gy	Every 2 years
		0-14.99 Gy	Every 5 years
5+ years	≥250 mg/m2	Any dose	Every 2 years

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MEDICALLY NECESSARY SCREENING ECHOCARDIOGRAM INDICATIONS			
Age at Time of Exposure	**Cumulative Doxorubicin Equivalent Dose**	**Cumulative Radiation Dose to Cardiac Muscle**	**Echocardiogram Frequency**
	0-249 mg/m2	15+ Gy	Every 2 years
		0-14.99 Gy	Every 5 years
	None	35+ Gy	Every 2 years
		15-34.99 Gy	Every 5 years
		0-14.99 Gy	None
All ages with known ventricular dysfunction			Annual

- Stress echocardiography is not considered medically necessary as a screening study for anthracycline cardiotoxicity in the absence of coronary artery disease symptoms. See **Stress Testing with Imaging – Indications (CD-1.4)** for imaging guidelines.
- Female cancer survivors who are pregnant or planning to become pregnant:
  - If any of the following are present, echocardiogram is considered medically necessary as a baseline exam and in the 3rd trimester, and as clinically indicated for symptoms (see **Pregnancy – Maternal Imaging (CD-11.4)** in the Cardiology Imaging Guidelines) if ANY of the following are present:
    - Anthracycline or cardiotoxic chemotherapy/immunotherapy exposure
    - Chest radiotherapy

Background and Supporting Information

- Exposure to anthracycline chemotherapy and chest-directed radiation is a well-established risk factor for late-onset cardiomyopathy and heart failure in childhood cancer survivors (Sofia et al., 2021; Lim et al., 2025).
- Cardiac risk is influenced by age at treatment, cumulative anthracycline dose (doxorubicin-equivalent mg/m²), and presence of cardiac radiation exposure (Mansoor & Ibrahim, 2025; Sofia et al., 2021).

Evidence Discussion

- Echocardiography is the primary modality for detecting asymptomatic left ventricular dysfunction and monitoring progression over time (Sofia et al., 2021; Lim et al., 2025).

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- Long-term cohort studies demonstrate that subclinical cardiac dysfunction frequently precedes symptomatic heart failure, supporting surveillance echocardiography in at-risk survivors (Sofia et al., 2021; Lim et al., 2025).
- Early identification of reduced ventricular function allows for timely cardioprotective interventions, which may delay or prevent progression to overt heart failure (Mansoor & Ibrahim, 2025).
- Routine echocardiography in survivors without cardiotoxic exposures has not demonstrated benefit and risks overuse, reinforcing exposure-based surveillance principles (Graham et al., 2023; Lim et al., 2025).

Health Equity Considerations

Cardiotoxicity is a leading contributor to late morbidity and mortality among pediatric cancer survivors, yet access to timely cardiovascular surveillance, including echocardiography, remains uneven across populations. Survivors exposed to anthracyclines, chest-directed radiation, and newer targeted or immune-based therapies face lifelong risk for cardiomyopathy, arrhythmias, valvular disease, and heart failure, with cumulative incidence approaching 20% by 30 years after diagnosis (Mansoor& Ibrahim, 2025; Lim et al., 2025). Evidence indicates that racial and ethnic minoritized survivors, particularly non-Hispanic Black and Hispanic individuals, experience a higher burden of modifiable cardiovascular risk factors such as hypertension, obesity, and diabetes, which compound treatment-related cardiac injury (Graham, Sounderajah, & Johnson, 2023). These risks are further amplified by structural barriers, including limited access to specialty cardio-oncology care, inconsistent survivorship follow-up, insurance instability, and underrecognition of late effects in primary care, which can delay echocardiographic screening and early intervention (Graham et al., 2023; Lim et al., 2025).

Equitable implementation of cardiotoxicity surveillance guidelines requires consistent application of risk-based echocardiography protocols regardless of race, socioeconomic status, or geographic location. Updated recommendations from international and national groups emphasize stratified surveillance based on cumulative anthracycline dose, radiation exposure, age at treatment, and additional risk modifiers, with echocardiography remaining the cornerstone imaging modality for both clinical and subclinical dysfunction (Lim et al., 2025). However, disparities persist in adherence to these guidelines, with socially disadvantaged survivors more likely to be lost to follow-up and less likely to receive recommended imaging over time (Graham et al., 2023). Providers should therefore prioritize standardized surveillance pathways, clear transition planning from pediatric to adult care, and proactive management of modifiable cardiovascular risk factors. Integrating echocardiography into accessible survivorship care models and pairing imaging with education, care coordination, and culturally responsive support can help mitigate inequities and ensure that all pediatric cancer

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survivors benefit from early detection and prevention of cardiotoxicity (Mansoor & Ibrahim, 2025; Lim et al., 2025).

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Second Malignant Neoplasms (SMN) (PEDONC-19.3)

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Criteria

Screening for Breast Cancer in Individuals with a History of a Prior Malignancy

Indication	Medically Necessary Imaging Study
Individuals who received therapeutic radiation exposure in the following fields while they were under 30 years of age: • Chest (thorax) • Whole lung • Mediastinal • Axilla • Mini-mantle, mantle, or extended mantle • Total (TLI) or subtotal (SLTI) lymphoid irradiation • Total body irradiation (TBI)	Clinical breast exam every 6 months supplemented with the following: • MRI Breast (CPT® 77049) annually and annual mammogram beginning at age 25 or 8 years after completion of radiotherapy (whichever occurs later - screening breast MRI is not considered medically necessary prior to age 25)

Evaluation and Screening for CNS Tumors in Individuals with a History of a Prior Malignancy

Indication	Medically Necessary Imaging Study
Individuals with NF1 or NF2	MRI Brain without and with contrast (CPT® 70553) every 2 years after completion of radiotherapy
Individual with history of brain radiotherapy and new neurologic symptoms, including simple headache	MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging Study
Individual with history of spine radiotherapy and new neurologic symptoms including change in quality of pain	MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar Spine (CPT® 72158) without and with contrast • MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain
Individuals with history of brain radiotherapy and persistent neurologic symptoms	MRI Brain without and with contrast (CPT® 70553) annually
Individuals with history of spine radiotherapy and persistent neurologic symptoms	MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar Spine (CPT® 72158) without and with contrast • MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain

Screening for Colorectal Cancer in Individuals with a History of a Prior Malignancy

Indication	Medically Necessary Imaging Study
Individuals with ≥30Gy radiation exposure to the following fields: • Thoracic, Lumbar, Sacral, or Whole Spine • Abdomen • Pelvis • Total body irradiation (TBI)	Colonoscopy is recommended every 5 years beginning at age 30 or 5 years after radiation exposure (whichever is later)

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Indication	Medically Necessary Imaging Study
Individuals with: • Personal history of ulcerative colitis, GI malignancy, adenomatous polyps, or hepatoblastoma • Familial polyposis ◦ Family history of colorectal cancer or polyps in a first degree (parent or sibling) relative	Colonoscopy is recommended every 5 years beginning at age 30 or 5 years after radiation exposure (whichever is later)

Background and Supporting Information

- Childhood cancer survivors have a substantially increased lifetime risk of second malignant neoplasms, related to prior radiation, chemotherapy, genetic susceptibility, and younger age at exposure (Chao et al., 2019; Becktell et al., 2025).
- Common SMNs include breast, CNS, hematologic, thyroid, and colorectal malignancies, with risk patterns influenced by treatment fields and dose (Hornet et al., 2026; Shah et al., 2026).
- Survivorship screening recommendations are largely derived from COG and NCCN guidelines, emphasizing modality-specific screening for high-risk populations (Children's Oncology Group, 2023; NCCN, 2026).

Evidence Discussion

- Population-based studies show that risk-adapted surveillance improves early detection of treatable SMNs, particularly breast and colorectal cancers in radiation-exposed survivors (Wong et al., 2023; Becktell et al., 2025).
- For CNS tumors, evidence does not support routine imaging surveillance in asymptomatic survivors with normal neurologic examinations, except in defined genetic or high-risk groups (Co et al., 2019; Shah et al., 2026).
- While the American Cancer Society recently added computed tomographic colonography (CTC) (AKA "Virtual Colonoscopy") as an acceptable option for colorectal cancer screening of average-risk adults, the National Comprehensive Cancer Network and United States Preventive Services Task Force concluded that data was too premature to warrant its use in screening. Colonoscopy remains the preferred screening modality for survivors at highest risk of colorectal cancer (NCCN, 2026; Wong et al., 2023).

Health Equity Considerations

SMNs represent one of the most consequential late effects of pediatric and adolescent cancer therapy, accounting for a substantial proportion of non-relapse-related mortality

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among long-term survivors. Population-based and survivor cohort studies consistently demonstrate that childhood, adolescent, and young adult cancer survivors experience a two- to six-fold higher risk of developing SMNs compared with the general population, with cumulative incidence approaching 15–20% at 30 years in high-risk groups (Becktell et al., 2025; Chao et al., 2019; Hornet et al., 2026; Shah et al., 2026). Importantly, SMN risk and outcomes are not equitably distributed. Survivors exposed to higher-intensity therapies, such as chest or cranial radiation, alkylating agents, or hematopoietic stem cell transplantation, are disproportionately affected, and these exposures historically vary by treatment era, diagnosis, and access to specialized pediatric oncology care (Becktell et al., 2025; Hornet et al., 2026). Racial and ethnic disparities in SMN outcomes have also been observed, with evidence of poorer overall survival following SMN diagnosis among minoritized populations, even after adjustment for cancer type and stage, suggesting the influence of systemic factors beyond biology alone (Brown et al., 2020; Chao et al., 2019).

Equitable implementation of imaging surveillance for SMNs requires recognition that early detection is highly dependent on consistent access to long-term survivorship care, adherence to exposure-based screening guidelines, and timely diagnostic imaging when signs or symptoms arise. Survivors from lower socioeconomic backgrounds, those who experience gaps during transition from pediatric to adult care, and those without stable insurance coverage are more likely to be lost to follow-up and less likely to receive recommended surveillance imaging, increasing the likelihood of later-stage SMN detection and worse outcomes (Becktell et al., 2025; Hornet et al., 2026). Providers should emphasize standardized, risk-adapted surveillance pathways that are applied consistently across care settings and populations, with particular attention to high-risk groups such as survivors treated at young ages, females exposed to chest radiation, and patients with underlying cancer predisposition syndromes (Shah et al., 2026). Incorporating clear indications for imaging based on treatment exposures rather than demographic or access-related factors can help mitigate inequities and support earlier SMN detection, which has been shown to improve survival and reduce treatment-related morbidity (Brown et al., 2020; Chao et al., 2019).

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Osteonecrosis in Long Term Cancer Survivors (PEDONC-19.4)

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Criteria

- See: **Acute Lymphoblastic Leukemia (ALL) (PEDONC-3.2)** for information on imaging osteonecrosis in ALL during active treatment.

Indication	Medically Necessary Imaging Study
Prior to advanced imaging in individuals with suspected osteonecrosis	Plain films of symptomatic areas
Individuals with osteonecrosis with symptoms to suggest bone density issues	DEXA or Quantitative CT screening • DEXA or Quantitative CT screening is not considered medically necessary until age 18 unless a surgery, core decompression, or initiation of osteoporosis drugs will be planned based on the imaging results.
Advanced imaging is necessary for acute management decisions in individuals with osteonecrosis	MRI without contrast of the affected area(s)

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Indication	Medically Necessary Imaging Study
Surveillance imaging in individuals with osteonecrosis	Surveillance imaging of asymptomatic individuals to detect osteonecrosis is not considered medically necessary as it has not been shown to impact individual outcomes, and it is not standard to alter treatment based on imaging findings alone without symptoms • Follow-up MRI of incidentally discovered osteonecrosis findings in asymptomatic individuals has not been shown to impact individual outcomes and is not considered medically necessary • For known osteonecrosis with articular collapse on other imaging, CT without contrast of area of interest is considered medically necessary for surgical planning • Repeat advanced imaging may be considered on a case-by-case basis for individuals with osteonecrosis with specific documentation regarding how the advanced imaging will change current individual management

Background and Supporting Information

- Osteonecrosis is a recognized late effect of corticosteroid, chemotherapy, and radiation exposure, hematologic malignancies, and stem cell transplantation, with higher risk during adolescence (Rao et al., 2019; Yang et al., 2021).
- The hip, knee, shoulder, and ankle are most commonly affected, and disease may be asymptomatic in early stages (Kelly & Pottenger, 2022; Marcucci et al., 2019).
- Osteoradionecrosis of the jaw can occur in individuals receiving radiotherapy to the mandible or maxilla; those receiving ≥40Gy are at highest risk. Although unusual, it can also occur in any bone without symptoms. It is rare in other disease types (Rao et al., 2019; Yang et al., 2021).

Evidence Discussion

- Observational studies demonstrate that early MRI detection of osteonecrosis correlates with improved joint preservation options, whereas delayed diagnosis is

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associated with collapse and need for surgical intervention (Rao et al., 2019; Expert Panel on Musculoskeletal Imaging, 2022).

- Routine screening MRI in asymptomatic survivors without risk factors is not considered medically necessary and may lead to overdiagnosis and unnecessary follow-up (Marcucci et al., 2019).
- Evidence supports symptom-directed or risk-based imaging, optimizing benefit while minimizing unnecessary imaging burden (Kelly & Pottenger, 2022).

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CNS Vascular Changes in Pediatric Cancer Survivors Following CNS Radiation (PEDONC-19.5)

ONCP.CS.0019.5.A
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Criteria

Indication	Medically Necessary Imaging Study
All individuals of any age with new neurologic symptoms or headache and a history of cranial irradiation	MRI Brain without and with contrast (CPT® 70553) and MRA Head (CPT® 70544, 70545, or 70546)
Individuals with a history of cranial irradiation and any of the following additional risk factors: • Down syndrome, sickle cell disease, or neurofibromatosis 1 or 2 • Parasellar or suprasellar tumors (i.e., craniopharyngioma) • Radiation dose >50Gy • Radiation field involving Circle of Willis	MRI Brain without and with contrast (CPT® 70553) and MRA Head (CPT® 70544, 70545, or 70546) annually for 10 years post-treatment

Background and Supporting Information

- Cranial radiation therapy in childhood is associated with long-term cerebrovascular complications, including large-vessel arteriopathy, cavernous malformations, moyamoya-like changes, and ischemic stroke These complications may occur months to years after radiation exposure (Nordstrom et al., 2018; Reulen et al., 2021).
- Radiation-induced cavernomas are common on long-term MRI but often remain clinically silent (Becker et al., 2021; Di Giannatale et al., 2014).
- Vascular injury risk increases with younger age at exposure, higher radiation dose, and longer follow-up duration (van Dijk et al., 2016; Waxer et al., 2024).

Evidence Discussion

- Long-term cohort data demonstrate increased rates of stroke and cerebrovascular disease in cranially irradiated survivors, supporting imaging evaluation when neurologic symptoms or signs emerge (Reulen et al., 2021; van Dijk et al., 2016).

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- Studies of radiation-induced cavernomas indicate that routine MRI surveillance in asymptomatic survivors rarely changes management, as most lesions remain stable and clinically insignificant (Becker et al., 2021; Dallo Gallo et al., 2023).
- Evidence supports symptom-driven neurovascular imaging, balancing early detection of significant arteriopathy with the harms of routine surveillance imaging, including incidental findings and resource utilization (Waxer et al., 2024; Nordstrom et al., 2018).

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Hematopoietic Stem Cell Transplantation (HSCT) (PEDONC-20)

Guideline

General Considerations (PEDONC-20.0)
Pre-Transplant Imaging (PEDONC-20.1)
Post-Transplant Imaging (PEDONC-20.2)
References (PEDONC-20)

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General Considerations (PEDONC-20.0)

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Background and Supporting Information

- Hematopoietic stem cell transplantation (HSCT) is a therapeutic procedure involving infusion of hematopoietic stem cells to reconstitute the recipient's bone marrow and immune system after preparative conditioning with chemotherapy and/or radiation therapy (PDQ®, 2024).
- HSCT is broadly categorized as allogeneic (donor-derived stem cells) or autologous (patient-derived stem cells), with distinct goals, immune effects, and complication profiles (PDQ®, 2024; Chan et al., 2023).
  - Allogeneic ("allo"): The donor and recipient are different people, and there are multiple types depending on the source of the stem cells and degree of match between donor and recipient. This is most commonly used in diseases originating in the hematopoietic system, such as leukemias and lymphomas, and bone marrow failure syndromes or metabolic disorders. The goal is to replace the hematopoietic and immune system with healthy donor cells to treat the disease. Common types are:
    - Matched sibling donor (MSD or MRD): Donor and recipient are full siblings and HLA-matched
    - Matched unrelated donor (MUD): Donor and recipient are HLA matched but not related to each other
    - Cord blood: Donor stem cells come from frozen umbilical cord blood not related to the recipient, sometimes from multiple different donors at once
    - Haploidentical transplant (haplo): Donor is a half-HLA match to the recipient, usually a parent
  - Autologous ("auto"): The donor and recipient are the same person. The process involves delivery of high dose chemotherapy that is ablative to the bone marrow, followed by an infusion of one's own harvested stem cells. This is primarily done in the context of solid tumors and the stem cells mainly rescue hematopoiesis to facilitate high-dose chemotherapy.
- Allogeneic HSCT is associated with prolonged immunosuppression due to immune reconstitution and preventive or therapeutic immunosuppression for graft-versus-host disease (GVHD), resulting in sustained vulnerability to infectious and noninfectious complications (PDQ®, 2024; Chan et al., 2023).
- Imaging in HSCT is not directed at graft function itself, but rather at baseline assessment, detection of occult disease, and evaluation of peri-transplant and post-transplant complications affecting multiple organ systems (Chan et al., 2023).

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- Complications vary by transplant type, conditioning regimen, and time relative to transplantation, with early complications predominated by infection and toxicity and later complications dominated by chronic GVHD, organ dysfunction, and secondary malignancies (Chan et al., 2023; PDQ®, 2024).

Evidence Discussion

- Expert consensus and observational evidence support selective, indication-based imaging in HSCT patients rather than routine whole-body surveillance, reducing unnecessary radiation exposure and downstream testing without compromising detection of clinically meaningful complications (Chan et al., 2023).
- The heterogeneity of HSCT indications and complication risks necessitates imaging approaches that are risk-adapted and symptom-driven, balancing early complication detection with the cumulative burden of imaging in a medically fragile population (PDQ®, 2024; Chan et al., 2023).
- Over-imaging in immunocompromised patients may result in incidental findings that prompt invasive procedures or prolonged antimicrobial therapy without demonstrated outcome benefit (Chan et al., 2023).
- The clinical evidence supports emphasis on organ-system-specific imaging, aligned to anticipated complication patterns and informed by transplant type, clinical status, and timing relative to transplant (Chan et al., 2023; PDQ®, 2024).

Health Equity Considerations

Equitable access to HSCT in pediatric populations is shaped by biologic risk, healthcare system structure, and social determinants of health. Population-based studies from publicly funded healthcare systems suggest that when financial barriers are minimized, receipt of HSCT is largely driven by disease-related factors rather than race or neighborhood socioeconomic status. In a national Canadian cohort of children with ALL, race and neighborhood income quintile were not associated with receipt of HSCT; however, diagnosis at a transplant-performing center and greater residential distance from the treating center were modestly associated with increased odds of transplantation, indicating potential influences of referral patterns and center-level practices (Truong et al., 2019).

Despite relatively equitable access to HSCT, disparities in post-transplant outcomes remain evident. U.S. registry data demonstrate that pediatric patients with malignant disease residing in high-poverty neighborhoods experience higher transplant-related mortality, and those insured by Medicaid have inferior overall survival compared with privately insured peers, even after adjustment for clinical characteristics (Bona et al., 2021). These findings suggest that household-level socioeconomic constraints and post-transplant support needs may contribute to outcome disparities independent of access to transplant. Biologic sex also intersects with equity considerations: although

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males are more likely to present with higher-risk disease and require HSCT, sex-based differences in survival, relapse, and transplant-related complications are attenuated following transplantation, potentially reflecting the impact of conditioning regimens and hormonal suppression on pre-existing biologic disparities (De Nardi et al., 2022).

Health equity considerations extend beyond transplant recipients to include pediatric donors, who are most often siblings. Longitudinal studies indicate that pediatric donors experience transient reductions in physical and emotional functioning, with recovery over time; however, psychosocial follow-up and donor surveillance are inconsistently implemented due to resource and infrastructure limitations (Hou et al., 2023). Variability in donor support services represents an additional equity concern, particularly for families facing socioeconomic, geographic, or logistical barriers to longitudinal care. Recognition of these factors is important when interpreting imaging utilization, monitoring for transplant-related complications, and planning comprehensive, equitable care pathways for pediatric patients undergoing HSCT and their families.

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Pre-Transplant Imaging (PEDONC-20.1)

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Criteria

- Disease status assessment is considered medically necessary per individual disease guidelines if it has been 6 weeks or more between end of treatment imaging and HSCT or if there are signs and symptoms of disease progression.

Indication	Medically Necessary Imaging
Immediate pre-transplant period - screening for active or occult infection	• CT Chest with contrast or CT Chest without contrast (CPT® 71250 or CPT® 71260) ◦ CT Abdomen with contrast (CPT® 74160) for asymptomatic individuals if chest infection or disease is identified on CT Chest or for signs and symptoms of active abdominal infection including fever. ◦ For evaluation of pelvis signs or symptoms, CT Abdomen/Pelvis with contrast (CPT® 74177) is considered medically necessary. If diagnostic abdominal imaging has already been performed and only pelvic imaging is required, CT Pelvis with contrast (CPT® 72193) may be performed instead. • CT Sinus (CPT® 70486) is not considered medically necessary for screening prior to HSCT, but is considered medically necessary for signs or symptoms of infectious or disease involvement of the sinuses • For individuals receiving CAR-T, if required by institutional protocol, baseline MRI Brain without and with contrast (CPT® 70553)

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Indication	Medically Necessary Imaging
Individuals pre-transplant at risk of developing VOD, for pre-transplant baseline	• Abdominal ultrasound +/- Doppler (CPT® 76700 or 76705 +/- 93975)
Individuals pre-transplant with history of multiple blood transfusions at risk of iron overload, for iron quantification baseline	• CPT® codes as listed in **Transfusion-Associated (Secondary) Hemochromatosis (PEDAB-18.2)** in the immediate pre-transplant period even if done in the previous 12 months.
Suspected renal tubular dysfunction in individuals pre-transplant	• Nuclear renal imaging (CPT® 78700, CPT® 78701, CPT® 78707, CPT® 78708, CPT® 78709)

Background and Supporting Information

- Pre-transplant imaging serves to identify active or occult infection, establish baseline organ assessments, and evaluate transplant-related risk factors that may influence conditioning or supportive care (Chan et al., 2023).
- Immunosuppression from conditioning regimens places HSCT candidates at heightened risk for pulmonary and systemic infections, particularly invasive fungal disease, even in the absence of symptoms (Enger et al., 2023; Chan et al., 2023).
- Baseline imaging of the liver and heart may be relevant in patients with prior transfusion exposure, given the association between iron overload and adverse transplant outcomes (Chan et al., 2023).
- Sinus disease has not demonstrated a consistent association with peri-transplant outcomes in asymptomatic patients, limiting the utility of routine sinus imaging (Chan et al., 2023).

Evidence Discussion

- Pre-transplant chest CT has demonstrated utility in detecting clinically occult pulmonary infections in HSCT candidates, allowing initiation or modification of antimicrobial therapy prior to conditioning (Enger et al., 2023; Chan et al., 2023).
- Evidence does not support routine sinus CT screening, as studies show minimal impact on management decisions or surgical consultation rates, emphasizing the importance of avoiding low-yield imaging (Chan et al., 2023).
- Baseline liver ultrasound provide clinically meaningful comparators for post-transplant assessment of sinusoidal obstruction syndrome, as interval change rather than absolute measurement correlates with disease development (Chan et al., 2023).

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- MRI-based liver and cardiac iron quantification prior to transplantation correlates with post-transplant morbidity and mortality, supporting its role in selected high-risk populations while avoiding universal screening (Chan et al., 22023).
- Pre-transplant imaging practices that balance early identification of high-risk conditions with avoidance of unnecessary radiation and sedation reflect evidence-based risk stratification principles outlined in national consensus guidance (Enger et al., 2023; Chan et al., 023).

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Post-Transplant Imaging (PEDONC-20.2)

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Criteria

Early post-transplant complication (<100 days post HSCT):

Indication	Medically Necessary Imaging
For signs and symptoms of pulmonary infection or pulmonary edema or new CXR abnormalities in individuals post-transplant	• CT Chest without or with contrast (CPT® 71250 or CPT® 71260) ◦ For PET/CT requests to clarify infection vs malignancy, see disease-specific guidelines for equivocal conventional imaging
Suspected impending lung necrosis on other imaging in individuals post-transplant	• MRI Chest without and with contrast (CPT® 71552)
• EITHER of the following in individuals post-transplant: ◦ Suspected graft vs. host disease (GVHD) of chest ◦ Bronchiolitis Obliterans (BOOP/BOS)	• High-resolution CT Chest without contrast (CPT® 71250)
• ANY of the following in individuals post-transplant: ◦ Suspected intra-abdominal and or pelvic infection (including cystitis or typhlitis) ◦ Suspected small bowel GVHD	• Abdominal Ultrasound (CPT® 76700 or CPT® 76705) +/- Pelvic Ultrasound (CPT® 76856 or CPT® 76857) ◦ CT Abdomen and Pelvis with contrast (CPT® 74177) for unclear findings on ultrasound
High clinical suspicion for intra-abdominal fungal infection in individuals post-transplant	• CT Abdomen and Pelvis with contrast (CPT® 74177)
Suspected hepatic veno-occlusive disease (VOD) in individuals post-transplant	• Ultrasound elastography (CPT® 91200) or Abdominal Ultrasound with Doppler (CPT® 76700 or CPT® 76705)

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Indication	Medically Necessary Imaging
Suspected CNS complication including infection, hemorrhage, thrombosis, or encephalopathy in individuals post-transplant	• MRI Brain without contrast or MRI Brain without and with contrast (CPT® 70551 or CPT® 70553) ◦ CT Head without contrast (CPT® 70450) in the emergent setting or for suspected acute hemorrhage ▪ Acute CT should not preclude subsequent MRI imaging ◦ For additional imaging for suspected stroke, see: **Pediatric Stroke Initial Imaging (PEDHD-12.2)** in the Pediatric Head Imaging guidelines
Suspected musculoskeletal abscess or necrotizing fasciitis in individuals post-transplant	• See: **Pediatric Infection/Osteomyelitis (PEDMS-8)** in the Pediatric Musculoskeletal Imaging guidelines
Fever of unknown origin (8 or more days of temperature 38.0 C/100.4 F or higher) in individuals post-transplant	• PET/CT skull to thigh (CPT® 78815) if site-specific conventional imaging, microbiologic serologic studies, echocardiogram, urinalysis, and urine culture are all non-diagnostic
New neurologic symptoms on CAR-T	• MRI Brain without and with contrast (CPT® 70553)

Late post-transplant complication imaging (100 or more days post HSCT):

Indication	Medically Necessary Imaging
CNS complications in individuals post-transplant	Same imaging as for early post-transplant
Chest complications in individuals post-transplant	Same imaging as for early post-transplant
Hepatic VOD in individuals post-transplant	Same imaging as for early post-transplant

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Indication	Medically Necessary Imaging
Chronic GI GVHD in individuals post-transplant	• CT Abdomen and Pelvis with contrast (CPT® 74177) ◦ MR Enterography (CPT® 74183 and CPT® 72197) for suspected small bowel GVHD
Suspected renal tubular dysfunction in individuals post-transplant	• Nuclear renal imaging (CPT® 78700, CPT® 78701, CPT® 78707, CPT® 78708, CPT® 78709)
Suspected poor bone mineral density or osteonecrosis in individuals post-transplant	See: **Osteonecrosis in Long Term Cancer Survivors (PEDONC-19.4)**
Suspected PTLD in individuals post-transplant	See: **Post-Transplant Lymphoproliferative Disorder (PTLD) (PEDONC 5.3)**

Background and Supporting Information

- Post-transplant imaging is directed toward identifying transplant-related complications, which evolve over time and vary by organ system (Chan et al., 2023).
- Early post-transplant complications (<100 days) are dominated by infection, hemorrhage, and treatment-related toxicity, while late complications include chronic GVHD, organ fibrosis, and secondary malignancies (Chan et al., 2023; PDQ®, 2024).
- Pulmonary complications represent one of the most frequent causes of post-transplant morbidity, with radiologic findings often preceding clinical deterioration (Enger et al., 2023; Chan et al., 2023).
- Imaging selection is influenced by patient stability, need for sedation, radiation exposure concerns, and the diagnostic performance of modality-specific techniques across organ systems (Chan et al., 2023).

Evidence Discussion

- Chest CT provides high sensitivity for detecting early pulmonary infection and transplant-related lung injury, supporting its role when initial screening studies are inconclusive or clinical suspicion persists (Enger et al., 2023; Chan et al., 023).
- Ultrasound-based imaging strategies for abdominal and hepatic complications allow effective screening with minimal risk, reserving cross-sectional imaging for problem-solving and disease extent assessment (Chan et al., 2023).

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- MRI is favored for central nervous system and musculoskeletal complications due to its superior soft-tissue contrast and avoidance of ionizing radiation, particularly in long-term survivors requiring repeated evaluations (Chan et al., 2023).
- Evidence supports an imaging approach that is symptom-driven and complication-specific, minimizing cumulative imaging burden while maintaining high sensitivity for clinically actionable post-transplant complications (Chan et al., 2023; Enger et al., 2023).

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Procedure Codes Associated with Pediatric and Special Populations Oncology Imaging (PEDONC)

Guideline

Procedure Codes Associated with Pediatric and Special Populations Oncology Imaging (PEDONC)

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Procedure Codes Associated with Pediatric and Special Populations Oncology Imaging (PEDONC)

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The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Description
70450	Computed tomography, head or brain; without contrast material
70460	Computed tomography, head or brain; with contrast material(s)
70470	Computed tomography, head or brain; without contrast material, followed by contrast material(s) and further sections
70481	Computed tomography, orbit, sella, or posterior fossa or outer, middle, or inner ear; with contrast material(s)
70486	Computed tomography, maxillofacial area; without contrast material
70487	Computed tomography, maxillofacial area; with contrast material(s)
70488	Computed tomography, maxillofacial area; without contrast material, followed by contrast material(s) and further sections
70491	Computed tomography, soft tissue neck; with contrast material(s)
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70543	Magnetic resonance (eg, proton) imaging, orbit, face, and/or neck; without contrast material(s), followed by contrast material(s) and further sequences
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences

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Code	Description
70551	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material
70552	Magnetic resonance (eg, proton) imaging, brain (including brain stem); with contrast material(s)
70553	Magnetic resonance (eg, proton) imaging, brain (including brain stem); without contrast material, followed by contrast material(s) and further sequences
70554	Magnetic resonance imaging, brain, functional MRI; including test selection and administration of repetitive body part movement and/or visual stimulation, not requiring physician or psychologist administration
70555	Magnetic resonance imaging, brain, functional MRI; requiring physician or psychologist administration of entire neurofunctional testing
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
72141	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; without contrast material
72142	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; with contrast material(s)
72147	Magnetic resonance (eg, proton) imaging, spinal canal and contents, thoracic; with contrast material(s)
72149	Magnetic resonance (eg, proton) imaging, spinal canal and contents, lumbar; with contrast material(s)
72156	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; cervical
72157	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; thoracic
72158	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; lumbar

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Code	Description
72193	Computed tomography, pelvis; with contrast material(s)
72197	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s), followed by contrast material(s) and further sequences
73721	Magnetic resonance (eg, proton) imaging, any joint of lower extremity; without contrast material
73723	Magnetic resonance (eg, proton) imaging, any joint of lower extremity; without contrast material(s), followed by contrast material(s) and further sequences
74160	Computed tomography, abdomen; with contrast material(s)
74170	Computed tomography, abdomen; without contrast material, followed by contrast material(s) and further sections
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
74178	Computed tomography, abdomen and pelvis; without contrast material in one or both body regions, followed by contrast material(s) and further sections in one or both body regions
74183	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s), followed by with contrast material(s) and further sequences
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
76390	Magnetic resonance spectroscopy
76498	Unlisted magnetic resonance procedure (eg, diagnostic, interventional)
76506	Echoencephalography, real time with image documentation (gray scale) (for determination of ventricular size, delineation of cerebral contents, and detection of fluid masses or other intracranial abnormalities), including A-mode encephalography as secondary component where indicated
76510	Ophthalmic ultrasound, diagnostic; B-scan and quantitative A-scan performed during the same patient encounter
76511	Ophthalmic ultrasound, diagnostic; quantitative A-scan only

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Code	Description
76512	Ophthalmic ultrasound, diagnostic; B-scan (with or without superimposed non-quantitative A-scan)
76536	Ultrasound, soft tissues of head and neck (eg, thyroid, parathyroid, parotid), real time with image documentation
76641	Ultrasound, breast, unilateral, real time with image documentation, including axilla when performed; complete
76642	Ultrasound, breast, unilateral, real time with image documentation, including axilla when performed; limited
76700	Ultrasound, abdominal, real time with image documentation; complete
76705	Ultrasound, abdominal, real time with image documentation; limited (eg, single organ, quadrant, follow-up)
76770	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), real time with image documentation; complete
76856	Ultrasound, pelvic (nonobstetric), real time with image documentation; complete
76857	Ultrasound, pelvic (nonobstetric), real time with image documentation; limited or follow-up (eg, for follicles)
76870	Ultrasound, scrotum and contents
76881	Ultrasound, complete joint (ie, joint space and peri-articular soft-tissue structures), real-time with image documentation
76882	Ultrasound, limited, joint or focal evaluation of other nonvascular extremity structure(s) (eg, joint space, peri-articular tendon[s], muscle[s], nerve[s], other soft-tissue structure[s], or soft-tissue mass[es]), real-time with image documentation
77049	Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; bilateral
77084	Magnetic resonance (eg, proton) imaging, bone marrow blood supply
78075	Adrenal imaging, cortex and/or medulla
78300	Bone and/or joint imaging; limited area
78305	Bone and/or joint imaging; multiple areas

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Code	Description
78306	Bone and/or joint imaging; whole body
78315	Bone and/or joint imaging; 3 phase study
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78608	Brain imaging, positron emission tomography (PET); metabolic evaluation
78609	Brain imaging, positron emission tomography (PET); perfusion evaluation
78700	Kidney imaging morphology
78701	Kidney imaging morphology; with vascular flow
78707	Kidney imaging morphology; with vascular flow and function, single study without pharmacological intervention
78708	Kidney imaging morphology; with vascular flow and function, single study, with pharmacological intervention (eg, angiotensin converting enzyme inhibitor and/or diuretic)
78709	Kidney imaging morphology; with vascular flow and function, multiple studies, with and without pharmacological intervention (eg, angiotensin converting enzyme inhibitor and/or diuretic)
78800	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging
78801	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days
78802	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) , single area (eg, head, neck, chest, pelvis), single day imaging

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Code	Description
78804	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, requiring 2 or more days imaging
78813	Positron emission tomography (PET) imaging; whole body
78814	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; limited area (eg, chest, head/neck)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh
78816	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; whole body
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging
78831	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
78832	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (eg, pelvis and knees, chest and abdomen) or separate acquisitions (eg, lung ventilation and perfusion), single day imaging, or single area or acquisition over 2 or more days
91200	Liver elastography, mechanically induced shear wave (eg, vibration), without imaging, with interpretation and report

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Code	Description
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93307	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, without spectral or color Doppler echocardiography
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
93321	Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); follow-up or limited study (List separately in addition to codes for echocardiographic imaging)
93325	Doppler echocardiography color flow velocity mapping (List separately in addition to codes for echocardiography)
93975	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study
93976	Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study

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General Guidelines (PEDPV-1)

Guideline

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General Guidelines (PEDPV-1.0)

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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms, including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the pelvis is not supported. Advanced imaging of the pelvis is only considered medically necessary in individuals who have documented active clinical signs or symptoms of disease involving the pelvis.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the pelvis are considered not medically necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.
- Ultrasound
  - Ultrasound should be the initial imaging in most pelvic conditions to rule out those situations that do not require additional advanced imaging.
  - For those individuals who do require advanced imaging after ultrasound, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the individual.
  - CPT® codes vary by body area and presence or absence of Doppler imaging and are included in the table at the end of this guideline.
  - Transabdominal ultrasound is appropriate in all pediatric individuals.
  - Transvaginal (TV) ultrasound is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Ultrasound (complete CPT® 76856 or, limited CPT® 76857) should substitute for TV in pediatric individuals or non-sexually active adult females

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social

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conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Pediatric Pelvis Imaging Age Considerations (PEDPV-1.1)

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Many conditions affecting the pelvis in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.

- Individuals who are under 19 years of age should be imaged according to the Pediatric Pelvis Imaging Guidelines if discussed. Any conditions not specifically discussed in the Pediatric Pelvis Imaging Guidelines should be imaged according to the General Pelvis Imaging Guidelines. Individuals 19 years of age or older should be imaged according to the General Pelvis Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Pediatric Pelvis Imaging Modality General Considerations (PEDPV-1.3)

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Criteria

- Ultrasound
  - See **General Guidelines (PEDPV-1.0)**
- MRI
  - MRI Pelvis is generally performed without and with contrast (CPT® 72197) unless the individual has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize individual movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years) as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this individual population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
    - If multiple body areas are supported by the guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
  - The presence of surgical hardware or implanted devices may preclude MRI.
  - The selection of best examination may require coordination between the provider and the imaging service.
- CT
  - CT Pelvis typically extends from the iliac crest to the ischial tuberosities, and CT Abdomen and Pelvis extends from the dome of the diaphragm through the ischial tuberosities.
    - In general, CT Pelvis is appropriate when evaluating solid pelvic organs.

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        - In general, CT Abdomen and Pelvis is appropriate when evaluating inflammatory or infections processes, hematuria, or conditions which appear to involve both the abdomen and the pelvis.
        - In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
    - The contrast level in pediatric CT imaging is specific to the clinical indication, as listed in the specific guideline sections.
    - CT Pelvis or Abdomen and Pelvis may be considered medically necessary for further evaluation of abnormalities suggested on prior US or MRI Procedures.
    - CT may be appropriate without prior MRI or US, as indicated in specific sections of these guidelines.
    - CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
    - The selection of best examination may require coordination between the provider and the imaging service.
- Nuclear Medicine
    - Nuclear medicine studies are rarely used in imaging of the pediatric pelvis but are considered medically necessary in rare circumstances, including the following:
        - Lymph system mapping (CPT® 78195) is considered medically necessary for lower extremity lymphedema with recent negative Doppler ultrasound, or a history of Milroy's disease or prior pelvic lymph node dissection.
- 3D Rendering
    - 3D Rendering indications in pediatric pelvis imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

Evidence Discussion

Evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast (American College of Radiology [ACR], 2026; Starekova, Pirasteh, & Reeder, 2024). There is currently no evidence to suggest that gadolinium retention in the brain is harmful, and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time (ACR, 2026; Starekova, Pirasteh, & Reeder, 2024). GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed (ACR, 2026; Starekova, Pirasteh, & Reeder, 2024).

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Abnormal Uterine Bleeding (PEDPV-2)

Guideline

Abnormal Uterine Bleeding (PEDPV-2.1)
References (PEDPV-2)

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Abnormal Uterine Bleeding (PEDPV-2.1)

PVP.UB.0002.1.A
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Criteria

- Abnormal uterine bleeding imaging indications in pediatric individuals are very similar to those for adult individuals. See **Abnormal Uterine Bleeding (AUB) (PV-2.1)** in the General Pelvis Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - Transabdominal ultrasound is appropriate in all pediatric individuals.
  - Transvaginal (TV) ultrasound is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in pediatric individuals or in individuals who have never been sexually active.
  - MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary if ultrasound is inconclusive.

Background and Supporting Information

The causes of vaginal bleeding in children differ from those in adolescents. Vaginal bleeding after the first week or so of life but before menarche is always abnormal and warrants evaluation. Common conditions before normal menarche include vaginal foreign bodies, infections, precocious puberty, and estrogen exposure. After menarche, pregnancy and excessive menstrual bleeding (ovulatory dysfunction) must be considered.

Evidence Discussion

In pediatric abnormal uterine bleeding, imaging is not routinely required because most cases are related to normal developmental changes in menstrual cycles and are evaluated clinically with laboratory testing, which helps avoid unnecessary imaging and overuse (Haamid & Sucato, 2024). Transabdominal ultrasound is appropriate as a first-line modality when imaging is indicated, particularly for evaluation of a suspected mass or when bleeding persists despite treatment, while transvaginal ultrasound is reserved for selected patients based on maturity and consent (Haamid & Sucato, 2024). MRI is reserved for inconclusive ultrasound findings and offers improved soft tissue characterization (Haamid & Sucato, 2024).

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Pelvic Inflammatory Disease (PID) (PEDPV-3)

Guideline

Pelvic Inflammatory Disease (PID) (PEDPV-3.1)
References (PEDPV-3)

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Pelvic Inflammatory Disease (PID) (PEDPV-3.1)

PVP.ID.0003.1.A
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Criteria

- Pelvic inflammatory disease imaging indications in pediatric individuals are very similar to those for adult individuals. See **Pelvic Inflammatory Disease (PV-7.1)** in the General Pelvis Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - Transabdominal ultrasound is appropriate in all pediatric individuals.
  - Transvaginal (TV) ultrasound is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in individuals who are pre-pubescent or victims of abuse.
  - MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) is considered medically necessary if ultrasound is inconclusive.
  - CT Pelvis with contrast (CPT® 72193) is considered medically necessary if MRI is not readily available.

Evidence Discussion

Ultrasound is the first-line imaging modality for suspected pediatric pelvic inflammatory disease because it is noninvasive, readily available, and can identify complications such as pyosalpinx, tubo-ovarian complex, and tubo-ovarian abscess (Caprio et al., 2019). However, early disease may demonstrate subtle or nondiagnostic imaging findings, limiting sensitivity and reinforcing reliance on clinical judgment (Caprio et al., 2019).

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Amenorrhea (PEDPV-4)

Guideline

Amenorrhea (PEDPV-4.1)
References (PEDPV-4)

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Amenorrhea (PEDPV-4.1)

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Criteria

- Females with primary amenorrhea and any of the following should be evaluated initially with pelvic ultrasound (CPT® 76856 or CPT® 76857):
  - Normal pubertal development and negative pregnancy test
  - Transabdominal ultrasound is appropriate in all pediatric individuals.
    - Transvaginal (TV) ultrasound is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound (CPT® 76830) is considered medically necessary for better view of genitourinary anomalies in sexually active females.
  - Delayed puberty with follicle-stimulating hormone (FSH) or luteinizing hormone (LH) that is elevated for the individual's age and Tanner stage.
- MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary for pre-operative planning.
- If congenital Müllerian anomalies are suspected, see **Congenital Müllerian Uterine and Vaginal Anomalies (PV-14)** in the General Pelvis Guidelines.

Background and Supporting Information

Amenorrhea is usually primary and refers to absence of menstrual periods by age 16 (Caprio et al., 2019).

Evidence Discussion

Ultrasound is the first-line imaging modality for evaluating pediatric amenorrhea because it is noninvasive and allows assessment of uterine presence, morphology, and ovarian development, which helps distinguish structural from endocrine causes (Caprio et al., 2019). Imaging improves diagnostic specificity by identifying Müllerian anomalies, outflow obstruction, or ovarian pathology that may not be evident clinically (Caprio et al., 2019). However, reliance on imaging alone may be limited in functional or hormonal etiologies (Caprio et al., 2019).

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Endometriosis (PEDPV-5)

Guideline

Endometriosis (PEDPV-5.1)
Reference (PEDPV-5)

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Endometriosis (PEDPV-5.1)

PVP.EM.0005.1.A
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Criteria

- Endometriosis imaging indications in pediatric individuals are very similar to those for adult individuals. See **Endometriosis (PV-6.1)** in the General Pelvis Imaging Guidelines.
- Pediatric-specific imaging considerations include:
  - Transabdominal ultrasound is appropriate in all pediatric individuals.
  - Transvaginal (TV) ultrasound is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in individuals who are pre-pubescent or have never been sexually active.

Evidence Discussion

Transabdominal ultrasound is the first-line imaging modality in adolescents with suspected endometriosis because it is noninvasive and can exclude alternative causes of pelvic pain, though it has limited sensitivity for detecting deep disease (Lampl et al., 2025). However, imaging may fail to detect superficial lesions, which are common in adolescents, creating a risk of false reassurance and underscoring that negative imaging does not exclude disease (Lampl et al., 2025).

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Suspected Adnexal Mass (PEDPV-6)

Guideline

Suspected Adnexal Mass (PEDPV-6.1)
References (PEDPV-6)

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Suspected Adnexal Mass (PEDPV-6.1)

PVP.AM.0006.1.A
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Criteria

- Suspected adnexal mass imaging indications in pediatric individuals are very similar to those for adult individuals. See **Adnexal Mass/Ovarian Cysts (PV-5)** in the General Pelvis Imaging Guidelines. Ultrasound is the first study for evaluation of a suspected adnexal mass.
- Pediatric-specific imaging considerations include the following:
  - Transabdominal ultrasound is appropriate in all pediatric individuals.
  - Transvaginal (TV) Ultrasound is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in individuals who are pre-pubescent or have never been sexually active.
  - Adnexal masses with a solid component in individuals, age ≥15 years, should be imaged according to **Pediatric Germ Cell Tumors (PEDONC-10)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Evidence Discussion

Ultrasound is the first-line imaging modality for suspected pediatric adnexal masses because it is noninvasive and allows characterization of lesion size, structure, and vascularity, which improves diagnostic specificity and guides management (Caprio et al., 2019).

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Pelvic Pain/ Dyspareunia, and Ovarian Torsion (PEDPV-7)

Guideline

Pelvic Pain/Dyspareunia, and Ovarian Torsion (PEDPV-7.1)
References (PEDPV-7)

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Pelvic Pain/Dyspareunia, and Ovarian Torsion (PEDPV-7.1)

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Criteria

- Pelvic Pain/Dyspareunia imaging indications in pediatric individuals are identical to those for adult individuals. See **Pelvic Pain/Dyspareunia, Female (PV-11.1)** in the General Pelvis Imaging Guidelines.
- Transabdominal ultrasound (CPT® 76856) with Doppler (CPT® 93975) is appropriate in all pediatric individuals.
- Transvaginal (TV) ultrasound (CPT® 76830) with Doppler (CPT® 93975) is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in individuals who are pre-pubescent or have never been sexually active.

Background and Supporting Information

Ovarian torsion in children is typically associated with a normal ovary. Spontaneous torsion of a normal ovary is more common than torsion caused by a lead mass, such as a cyst or tumor. Torsion involves both the ovary and fallopian tube and typically presents with acute of onset of lower abdominal pain, often associated with nausea or vomiting.

Evidence Discussion

Ultrasound is the first-line imaging modality for pediatric pelvic pain and suspected ovarian torsion because it is noninvasive and can identify characteristic findings such as enlarged ovary, abnormal echotexture, and the twisted vascular pedicle, which improves diagnostic accuracy (Caprio et al., 2019).

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Polyendocrine Metabolic Ovarian Syndrome (PEDPV-8)

Guideline

Polyendocrine Metabolic Ovarian Syndrome (PMOS) (PEDPV-8.1)
References (PEDPV-8)

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Polyendocrine Metabolic Ovarian Syndrome (PMOS) (PEDPV-8.1)

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Criteria

- Polyendocrine Metabolic Ovarian Syndrome (PMOS) – previously known as Polycystic ovary syndrome (PCOS) – imaging indications in pediatric individuals are very similar to those for adult individuals. See **Polyendocrine Metabolic Ovarian Syndrome (PMOS) (PV-8.1)** in the General Pelvis Imaging Guidelines.
- Pediatric-specific imaging considerations include:
  - Transabdominal ultrasound (CPT® 76856) is appropriate in all pediatric individuals.
  - Transvaginal (TV) ultrasound (CPT® 76830) is appropriate in pediatric individuals who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in individuals who are pre-pubescent or have never been sexually active.

Background and Supporting Information

Adolescent girls may have multiple ovarian cysts as part of normal pubertal development (DiVall & Merjaneh, 2019; Baldauff & Witchel, 2017). As such the diagnosis should not be based on morphology alone, but requires abnormal laboratory studies.

Evidence Discussion

Transabdominal ultrasound is appropriate as a first-line, noninvasive modality that is well tolerated and broadly applicable in pediatric patients, though it may have limited sensitivity for detailed ovarian morphology (Baldauff & Witchel, 2017; Fondin et al., 2017). Transvaginal ultrasound provides improved anatomic detail but is generally restricted to sexually active or consenting patients due to appropriateness and comfort concerns in prepubescent individuals.

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Periurethral Cysts and Urethral Diverticula (PEDPV-9)

Guideline

Periurethral Cysts and Urethral Diverticula (PEDPV-9.1)

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Periurethral Cysts and Urethral Diverticula (PEDPV-9.1)

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- Periurethral cysts and urethral diverticula imaging indications in pediatric individuals are identical to those for adult individuals. See **Periurethral Cysts and Urethral Diverticula (PV-13)** in the General Pelvis Imaging Guidelines.

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Fetal MRI (PEDPV-10)

Guideline

Fetal MRI (PEDPV-10.1)

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Fetal MRI (PEDPV-10.1)

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- Fetal MRI indications in pediatric individuals are identical to those for adult individuals. See **Fetal MRI (PV-15.1)** in the General Pelvis Imaging Guidelines.

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Undescended Testis (PEDPV-11)

Guideline

Undescended Testis (PEDPV-11.1)
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Undescended Testis (PEDPV-11.1)

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Criteria

- Pediatric-specific imaging considerations include the following:
  - Suspected undescended testis is an indication for referral to a surgical subspecialist who should make the decision or be consulted on necessary imaging studies.
- After surgical evaluation or consultation, the following imaging is considered medically necessary for pre-operative evaluation:
  - Scrotal ultrasound (CPT® 76870) if testis not palpable in the scrotal sac and there is concern for retractile or inguinal testis. In general, CT and MRI are considered not medically necessary to localize non-palpable testes, as the findings would typically not alter the surgical procedure.
    - If after ultrasound there is concern for associated urogenital abnormalities, or the surgical consultant or any provider in consultation with the surgical consultant indicates that advanced imaging results would significantly alter the surgical procedure, either of the studies below are considered medically necessary:
      - MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast
      - CT Abdomen and Pelvis with contrast (CPT® 74177)

Background and Supporting Information

Males with a history of cryptorchidism (undescended testis) have a several-fold risk increase of testicular cancer. It is important to diagnose and treat this condition either by bringing the undescended testis into the scrotum, or resecting the testis.

Evidence Discussion

Clinical evaluation with careful palpation is the cornerstone for suspected undescended testis and supports early referral, as imaging rarely alters management and definitive diagnosis often requires surgical exploration. Scrotal ultrasound may be useful after specialist evaluation for suspected retractile or inguinal testes, but its limited sensitivity for nonpalpable testes and inability to confirm absence introduce a risk of false reassurance (Kolon et al., 2014). Advanced imaging such as MRI provides high specificity but only moderate sensitivity for identifying nonpalpable teses and poor localization of intraabdominal or atrophic testes, while adding cost and potential need for

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sedation, so it should be reserved for select cases in which results would meaningfully change surgical planning (Krishnaswami et al., 2013; Kolon et al., 2014).

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Scrotal Pathology (PEDPV-12)

Guideline

Scrotal Pathology (PEDPV-12.1)
References (PEDPV-12)

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Scrotal Pathology (PEDPV-12.1)

PVP.SP.0012.1.A
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Criteria

- Scrotal pathology imaging indications in pediatric individuals are very similar to those for adult individuals. See **Scrotal Pathology (PV-20.1)** in the General Pelvis Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - Scrotal US (CPT® 76870) with Doppler (CPT® 93975 or CPT® 93976) is considered medically necessary for concerns of testicular torsion.
  - MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary if torsion is unlikely on ultrasound and no surgical exploration is planned.
  - Since the acceptance of Doppler US as the primary imaging for evaluation of acute scrotum, scintigraphy is considered not medically necessary.

Evidence Discussion

Scrotal ultrasound with Doppler is the first-line imaging modality for pediatric scrotal pathology and suspected torsion because it provides noninvasive assessment of testicular perfusion, has high sensitivity for detecting intrascrotal abnormalities, and allows real-time vascular assessment (Lyshchik et al., 2022). MRI may be used when ultrasound is nondiagnostic, but MRI is not typically used for acute scrotum due to the limited availabity of equipment and the long examination time involved, which may delay urgent care (Lyshchik et al., 2022). Nuclear medicine scintigraphy is no longer routinely recommended because Doppler ultrasound has become the standard of care, and the unavailability of nuclear medicine imaging in many practices, its use of ionizing radiation, its poor anatomical details, and the time required for imaging are limiting factors (Lyshchik et al., 2022; MacDonald & Burrell, 2009).

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Penis-Soft Tissue Mass (PEDPV-13)

Guideline

Penis-Soft Tissue Mass (PEDPV-13.1)

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Penis-Soft Tissue Mass (PEDPV-13.1)

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- Penile soft tissue masses are very rare in pediatric individuals, and imaging indications are identical to those for adult individuals. See **Penis-Soft Tissue Mass (PV-18.1)** in the General Pelvis Imaging Guidelines.

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Incontinence (PEDPV-14)

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Incontinence (PEDPV-14.1)
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Incontinence (PEDPV-14.1)

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Criteria

- Incontinence imaging indications in pediatric individuals are very similar to those for adult individuals. See **Urinary Incontinence/Pelvic Prolapse/Fecal Incontinence (PV-22)** in the General Pelvis Imaging Guidelines.
- No imaging is needed if primary enuresis is suspected; however, imaging evaluation may be warranted if ureteral duplication or overactive bladder or dysfunctional voiding is suspected. The physician should obtain a full medical history and urinalysis before imaging is done.
- Radiopharmaceutical urinary bladder residual study (CPT® 78730) is considered medically necessary for suspicion of urinary retention and a recent non-diagnostic ultrasound.
- Pediatric-specific imaging considerations include the following:
  - MRI Pelvis without and with contrast (CPT® 72197) is considered medically necessary if ultrasound is inconclusive or spinal abnormality is suspected.
  - CT Pelvis with contrast (CPT® 72193) is considered medically necessaryif MRI is not readily available.

Background and Supporting Information

Most often incontinence in children is not due to a medical condition. Several uncommon disorders that can lead to urinary incontinence include a spinal cord defect such as spina bifida, ureteral duplication with ectopic insertion, and overactive bladder or dysfunctional voiding.

Evidence Discussion

In pediatric incontinence, clinical evaluation with history and urinalysis is essential because many cases such as primary enuresis do not require imaging, which helps avoid unnecessary radiation exposure and invasive testing (Arlen & Cooper, 2019). When imaging is indicated for suspected structural or functional abnormalities, ultrasound and voiding studies provide complementary information, with radionuclide cystography demonstrating similar sensitivity to conventional techniques for vesicoureteral reflux while reducing radiation exposure but offering limited anatomic detail (Mandell et al., 1997). Advanced imaging such as MRI is reserved for inconclusive cases or suspected neurologic or structural abnormalities due to its superior soft tissue characterization but higher cost and resource use (Arlen & Cooper, 2019).

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Patent Urachus (PEDPV-15)

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Patent Urachus (PEDPV-15.1)
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Patent Urachus (PEDPV-15.1)

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Criteria

- Ultrasound pelvis (CPT® 76856) is considered medically necessary as the initial evaluation for patent urachus.
  - ANY of the following are considered medically necessary if the ultrasound is inconclusive or insufficient for preoperative planning:
    - MRI Pelvis without contrast (CPT® 72195)
    - MRI Pelvis without and with contrast (CPT® 72197)
    - CT Pelvis with contrast (CPT® 72193)
- Repeat imaging of asymptomatic individuals is not generally necessary but is considered medically necessary for the following:
  - New or worsening symptoms
  - Preoperative planning

Background and Supporting Information

The urachus is a “tube” connecting the fetal bladder to the umbilical cord. It is usually obliterated during fetal growth, but if it remains patent, there can be a complete or partial connection between the bladder and the umbilicus.

Evidence Discussion

Ultrasound has an accuracy greater than 90% for urachal anomalies (Parada Villavicencio, et al., 2016). It is recommended as the initial imaging modality because it is noninvasive, lacks radiation, and reliably identifies the location and extent of a patent urachus (Parada Villavicencio et al., 2016; Little et al., 2005). Cross sectional imaging with MRI or CT is reserved for inconclusive cases or preoperative planning to better define anatomy and complications, but these modalities introduce tradeoffs such as higher cost, resource use, and radiation exposure with CT (Buddha et al., 2019; Parada Villavicencio et al., 2016).

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Procedure Codes Associated with Pelvis Imaging

Guideline

Procedure Codes Associated with Pelvis Imaging

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Procedure Codes Associated with Pelvis Imaging

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MRI	CPT®
MRI Pelvis without contrast	72195
MRI Pelvis with contrast (rarely used)	72196
MRI Pelvis without and with contrast	72197
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Pelvis	72198

CT	CPT®
CT Abdomen and Pelvis without contrast	74176
CT Abdomen and Pelvis with contrast	74177
CT Abdomen and Pelvis without and with contrast	74178
CT Pelvis without contrast	72192
CT Pelvis with contrast	72193
CT Pelvis without and with contrast	72194
CT Guidance for Needle Placement (Biopsy, Aspiration, Injection, etc.)	77012
CT Guidance for and monitoring of Visceral Tissue Ablation	77013

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CT	CPT®
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT®
CTA Abdomen and Pelvis	74174
CTA Pelvis	72191

Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Urinary Bladder Residual Study	78730
Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram)	78740
Testicular Scan – Vascular Flow and Delayed Images	78761
Radiopharmaceutical Imaging of Lymphatic System	78195
Radiopharmaceutical Localization Imaging Limited area	78800
Radiopharmaceutical Localization Imaging Whole Body	78802

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Nuclear Medicine	CPT®
Radiopharmaceutical Localization Imaging SPECT	78803

Ultrasound	CPT®
Ultrasound, pelvic (nonobstetric), complete	76856
Ultrasound, pelvic transvaginal	76830
Ultrasound, pelvic (nonobstetric), limited or follow-up	76857
Ultrasound, scrotum and contents	76870
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study	93975
Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study	93976
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete	93978
Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; limited	93979
Duplex scan of arterial inflow and venous outflow of penile vessels; complete	93980
Duplex scan of arterial inflow and venous outflow of penile vessels; limited study	93981

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General Guidelines (PEDPN-1)

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General Guidelines (PEDPN-1.0)
Age Considerations (PEDPN-1.1)
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General Guidelines (PEDPN-1.0)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination since the onset or change in symptoms with a thorough neurologic examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail, or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
  - Electromyography (EMG) may not be of clinical utility or obtainable in infants or individuals with severe developmental delay.
  - EMG/nerve conduction study (NCS) results may not be abnormal until 10 days after injury.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the peripheral nervous system is considered not medically necessary. Advanced imaging of the peripheral nervous system is only considered medically necessary in individuals who have documented active clinical signs or symptoms of disease involving the peripheral nervous system.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the peripheral nervous system are considered not medically necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Age Considerations (PEDPN-1.1)

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- Many conditions affecting the peripheral nervous system in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases that occur in both pediatric and adult populations, minor differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals under 19 years of age should be imaged according to the Pediatric Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines if discussed. Any conditions not specifically discussed in the Pediatric Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines should be imaged according to the General Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines. Individuals 19 years of age or older should be imaged according to the General Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Modality General Considerations (PEDPN-1.3)

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- MRI
  - MRI without and with contrast is the preferred modality for pediatric peripheral nerve imaging unless otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize individual movement, anesthesia is usually required for almost all infants (except neonates) and young children (age less than 7 years) as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this individual population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast is considered medically necessary if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
    - If multiple body areas are supported by the guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
- CT
  - CT is rarely used in the evaluation of pediatric peripheral nerve disorders. See specific guideline sections for indications.
- Ultrasound
  - Ultrasound is rarely used in the evaluation of pediatric peripheral nerve disorders. See specific guideline sections for indications.
- Nuclear Medicine
  - Nuclear medicine studies are generally considered not medically necessary in the evaluation of peripheral nerve disorders. See for specific imaging guidelines regarding PET/CT in evaluation of peripheral nerve tumors.
- 3D Rendering
  - 3D Rendering indications in pediatric PNND imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

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- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

Background and Supporting Information

The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time (FDA, 2018). It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.

Evidence Discussion

Recent evidence-based literature has demonstrated the potential for gadolinium deposition in various organs including the brain after the use of MRI contrast (FDA, 2018).

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Neurofibromatosis (PEDPN-2)

Guideline

Neurofibromatosis – General Information (PEDPN-2.0)
Neurofibromatosis 1 (PEDPN-2.1)
Neurofibromatosis 2 (PEDPN-2.2)

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Neurofibromatosis – General Information (PEDPN-2.0)

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- This guideline section includes imaging indications for individuals with neurofibromatosis and known benign lesions.
- For cancer screening guidelines, see **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** in the Pediatric Oncology Imaging Guidelines.
- For peripheral nerve sheath tumors, see **Peripheral Nerve Sheath Tumors (PNST) (PN-9.1)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.
- For guidelines related to known malignancies in individuals with NF1, see the appropriate imaging guideline for the specific cancer type.

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Neurofibromatosis 1 (PEDPN-2.1)

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- See **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** in the Pediatric Oncology Imaging Guidelines.
- For peripheral nerve sheath tumors, see **Peripheral Nerve Sheath Tumors (PNST) (PN-9.1)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.
- For guidelines related to known malignancies in individuals with NF1, see the appropriate imaging guideline for the specific cancer type.

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Neurofibromatosis 2 (PEDPN-2.2)

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- See **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** in the Pediatric Oncology Imaging Guidelines.
- Individuals with NF2 and known meningioma should be imaged according to **Meningiomas (Intracranial and Intraspinal) (ONC-2.8)** in the Oncology Imaging Guidelines.
- Individuals with NF2 and known ependymoma should be imaged according to **Ependymoma (PEDONC-4.8)** in the Pediatric Oncology Imaging Guidelines.

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Brachial Plexus (PEDPN-3)

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Brachial Plexus (PEDPN-3.1)
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Brachial Plexus (PEDPN-3.1)

PNP.BP.0003.1.A
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Criteria

Disorders of the brachial plexus can generally be identified and distinguished from lesions in other locations by clinical and electromyography/nerve conduction (EMG/NCS) examination. If the diagnosis remains unclear, advanced imaging can be helpful as a pre-operative study to evaluate the anatomy of brachial plexus lesions that should have already been defined by clinical examination. However, due to the technical challenges, EMG/NCS is not required prior to imaging in children.

- MRI is the preferred modality for imaging the brachial plexus.
  - CT is not often useful and should not be used as a substitute for MRI.
  - MRI Upper Extremity Other Than Joint without contrast (CPT® 73218) or MRI Upper Extremity Other Than Joint without and with contrast (CPT® 73220) is considered medically necessary for unilateral brachial plexus.
  - MRI Chest without contrast (CPT® 71550) or MRI Chest without and with contrast (CPT® 71552) is considered medically necessary for bilateral brachial plexus studies.
  - MRI Neck without contrast (CPT® 70540) is considered medically necessary for upper trunk lesions.
  - Even with unilateral symptoms, bilateral brachial plexus imaging may be considered medically necessary for appropriate comparison.
  - It is rare for more than one CPT® code to be necessary to adequately image the brachial plexus area of interest.
  - MRI Shoulder without contrast (CPT® 73221) or MRI Shoulder without and with contrast (CPT® 73223) is considered medically necessary in infants with brachial plexopathy due to birth trauma if requested for preoperative planning. These individuals often have glenohumeral dysplasia and require shoulder surgery.
  - MRI Cervical Spine without contrast (CPT® 72141) is considered medically necessary if there is clinical suspicion for cervical nerve root avulsion.
  - PET/CT skull base to mid-thigh (CPT® 78815) is appropriate if there is a contraindication to MRI in individuals with a known malignancy or post-treatment syndrome.

Background and Supporting Information

The goal of imaging is to visualize the entire course of the neural network from the preganglionic to the postganglionic segments.

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The MRI Chest and Neck are inherently bilateral, whereas MRI Upper Extremity is unilateral.

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Gaucher Disease (PEDPN-4)

Guideline

Gaucher Disease (PEDPN-4.1)

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Gaucher Disease (PEDPN-4.1)

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- Gaucher disease imaging indications in pediatric individuals are very similar to those for adult individuals. See **Gaucher Disease (Storage Disorders) (PN-8.6)** in the Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging Guidelines.

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Spinal Muscular Atrophy (PEDPN -5)

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Spinal Muscular Atrophy (PEDPN-5.1)

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Criteria

- Spinal Muscular Atrophy
  - Molecular genetic testing is the standard tool for diagnosis for the early consideration in any infant with weakness or hypotonia.
    - MRI is usually considered not medically necessary.
  - See **Developmental Motor Delay (PEDHD-19.3)** in the Pediatric Head Imaging Guidelines for presentation of weakness or a loss of skills.

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Procedure Codes Associated with Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging

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Procedure Codes Associated with Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging

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Procedure Codes Associated with Peripheral Nerve and Neuromuscular Disorders (PNND) Imaging

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MRI	CPT®
MRI Neck without contrast	70540
MRI Neck without and with contrast	70543
MRI Cervical without contrast	72141
MRI Cervical without and with contrast	72156
MRI Brachial Plexus without contrast (unilateral)	73218
MRI Brachial Plexus without and with contrast (unilateral)	73220
MRI Brachial Plexus without contrast (bilateral)	71550
MRI Brachial Plexus without and with contrast (bilateral)	71552
MRI Chest without contrast	71550
MRI Chest without and with contrast	71552
MRI Thoracic without contrast	72146
MRI Thoracic without and with contrast	72157
MRI Lumbar without contrast	72148
MRI Lumbar without and with contrast	72158
MRI Abdomen without contrast	74181

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MRI	CPT®
MRI Abdomen without and with contrast	74183
MRI Pelvis without contrast	72195
MRI Pelvis without and with contrast	72197
MRI Upper Extremity Other Than Joint without contrast	73218
MRI Upper Extremity Other Than Joint with contrast	73219
MRI Upper Extremity Other Than Joint without and with contrast	73220
MRI Upper Extremity Joint without contrast	73221
MRI Upper Extremity Joint with contrast	73222
MRI Upper Extremity Joint without and with contrast	73223
MRI Lower Extremity Other Than Joint without contrast	73718
MRI Lower Extremity Other Than Joint with contrast	73719
MRI Lower Extremity Other Than Joint without and with contrast	73720
MRI Lower Extremity Joint without contrast	73721
MRI Lower Extremity Joint with contrast	73722
MRI Lower Extremity Joint without and with contrast	73723
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Upper Extremity	73225
MRA Lower Extremity	73725

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Nuclear Medicine	CPT®
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816
Bone Marrow Imaging Limited Areas	78102
Bone Marrow Imaging Multiple Areas	78103
Bone Marrow Imaging Whole Body	78104
Nuclear Bone Scan Limited	78300
Nuclear Bone Scan Multiple Areas	78305
Nuclear Bone Scan Whole Body	78306
Bone Scan Three Phase	78315
Radiopharmaceutical Localization Imaging Limited Area	78800
Radiopharmaceutical Localization Imaging Whole Body	78802
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General Guidelines (PEDPVD-1)

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Procedure Codes Associated with PVD Imaging (PEDPVD)

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Description	CPT®
MRA	
Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequence	70546
Magnetic resonance angiography, neck; without contrast material(s), followed by contrast material(s) and further sequences	70549
Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)	71555
Magnetic resonance angiography, pelvis, with or without contrast material(s)	72198
Magnetic resonance angiography, upper extremity, with or without contrast material(s)	73225
Magnetic resonance angiography, lower extremity, with or without contrast material(s)	73725
Magnetic resonance angiography, abdomen, with or without contrast material(s)	74185
CTA	
Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing	70496
Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing	70498

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Description	CPT®
Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing	71275
Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing	70471
Computed tomographic angiography, upper extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing	73206
Computed tomographic angiography, lower extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing	73706
Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing	74174
Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing	74175
CTA Abdominal Aorta with Bilateral Iliofemoral Runoff	75635
Ultrasound	
Duplex scan of extracranial arteries; complete bilateral study	93880
Duplex scan of extracranial arteries; unilateral or limited study	93882
Non-invasive physiologic studies of extracranial arteries, complete bilateral study	93875
Limited bilateral noninvasive physiologic studies of upper or lower extremity arteries	93922
Complete bilateral noninvasive physiologic studies of upper or lower extremity arteries	93923
Duplex scan of upper extremity arteries or arterial bypass grafts; complete bilateral	93930

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Description	CPT®
Duplex scan of upper extremity arteries or arterial bypass grafts; unilateral or limited	93931
Non-invasive physiologic studies of extremity veins, complete bilateral study	93965
Duplex scan of extremity veins including responses to compression and other maneuvers; complete bilateral study	93970
Duplex scan of extremity veins including responses to compression and other maneuvers; unilateral or limited study	93971
Duplex scan of hemodialysis access (including arterial inflow, body of access, and venous outflow)	93990

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General Guidelines (PEDPVD-1.0)

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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms, including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) can serve as a pertinent clinical evaluation.
- The use of advanced imaging to screen asymptomatic individuals for disorders involving the peripheral vascular system is not considered medically necessary unless otherwise stated in a specific guideline section.
- Advanced imaging of the peripheral vascular system is considered medically necessary in individuals who have documented active clinical signs or symptoms of disease involving the peripheral vascular system.
- Repeat imaging studies of the peripheral vascular system are not medically necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect the individual's management or treatment decisions unless otherwise stated in a specific guideline section.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Age Considerations (PEDPVD-1.1)

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Many conditions affecting the peripheral vascular system in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and general populations, differences may exist in management due to the individual's age, comorbidities, and differences in disease natural history between children and adults.

- Individuals who are under 19 years of age should be imaged according to the Pediatric Peripheral Vascular Disease imaging guidelines if discussed. Any conditions not specifically discussed in the pediatric peripheral vascular disease imaging guidelines should be imaged according to the general peripheral vascular disease imaging guidelines. Individuals who are 19 years of age or older should be imaged according to the general Peripheral Vascular Disease imaging guidelines, except where directed otherwise by a specific guideline section.

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Modality General Considerations (PEDPVD-1.3)

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Criteria

- MRI
  - MRI is generally performed without and with contrast unless the individual has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize the individual's movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this population, MRI sessions should be planned with a goal of minimizing anesthesia exposure adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast is considered medically necessary if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
      - Recent evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If multiple body areas are supported for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
  - The presence of surgical hardware or implanted devices may preclude MRI.
  - The selection of best examination may require coordination between the provider and the imaging service.

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- CT
  - CT or CTA is considered medically necessary for further evaluation of abnormalities suggested on prior US or MRI procedures.
  - Contrast use in the pediatric population should follow clinical indication. CT may be appropriate for further evaluation of findings on prior imaging or as specified in condition-based guidelines, but should not replace MRI solely to avoid sedation unless recommended. Coordination between the provider and imaging service may be necessary to determine the optimal study.
  - CT is considered medically necessary without prior MRI or US, especially in the following (non-exhaustive list of) settings:
    - Lymphatic malformations
    - Vascular abnormalities (including vasculitis, thrombosis, narrowing, aneurysm, dissection, and varices)
    - For pre-operative planning or assessment of post-operative complications
  - In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
- Ultrasound
  - Ultrasound can be helpful in evaluating arterial, venous, and lymphatic malformations.
  - Ultrasound can be limited by the imaging window and the individual's body type.
  - CPT® codes vary by body area and presence or absence of Doppler imaging and are included in the table at the beginning of this guideline.
- 3D Rendering
  - 3D Rendering indications in pediatric imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines
- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be indicated and warranted for specific clinical situations.

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Vascular Anomalies (PEDPVD-2)

Guideline

Lymphatic Malformations (PEDPVD-2.2)
Venous Malformations (PEDPVD-2.3)
Capillary Malformations (PEDPVD-2.4)
Arteriovenous Malformations (AVMs) and Fistulas (PEDPVD-2.5)
Vascular Tumors (PEDPVD-2.6)
References (PEDPVD-2)

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Lymphatic Malformations (PEDPVD-2.2)

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Criteria

Initial imaging

- Ultrasound is considered medically necessary as an initial examination for superficial lesions.
- CT with contrast of the affected body part is considered medically necessary for lesions with acute enlargement and concerns for compression when MRI is contraindicated.
- MRI without contrast or without and with contrast of the affected body part is considered medically necessary for:
  - Lymphatic malformations involving deep tissues
  - Malformations too large to be completely imaged with ultrasound
  - Inconclusive ultrasound findings
  - Preoperative planning

Clinical changes and monitoring treatment

MRI without contrast or without and with contrast of the affected body part is considered medically necessary every 3 months during active treatment for individuals with aggressive lesions being treated with systemic therapy.

MRI without contrast or without and with contrast of the affected body part is considered medically necessary for:

- Preoperative planning
- Post-treatment evaluation

CT with contrast of the affected body part is considered medically necessary to evaluate lesions with acute enlargement and concerns for compression when MRI is contraindicated.

Surveillance

Annual surveillance imaging with MRI without contrast or without and with contrast is considered medically necessary when lymphatic malformations are located in body areas where growth could cause significant organ dysfunction or functional impairment (e.g. airway, intestine).

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Evidence Discussion

Vascular and lymphatic malformations encompass a broad variety of conditions and have very heterogeneous natural history and treatment approaches. Lesions can be divided into low flow lesions (lymphatic, capillary and venous malformations), and high-flow lesions (arteriovenous malformations and fistulas).

Lymphatic malformations are composed of dilated lymphatic channels filled with proteinaceous fluid and do not connect to normal lymphatic channels. They are typically soft, non-pulsatile masses with normal overlying skin. MRI is often used for further characterization of lymphatic malformations, especially for deep or complex lesions, providing detailed images without ionizing radiation. Large lesion characterization may be limited by ultrasound imaging window. Ultrasound is the initial imaging of choice however it is limited in evaluating malformation relationship to airway or bony structures (Snyder et al., 2022).

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Venous Malformations (PEDPVD-2.3)

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Venous Malformation Imaging Indications

Criteria

Initial imaging

- Ultrasound with Doppler is considered medically necessary as an initial examination for superficial lesions.
- MRI without contrast or without and with contrast of the affected body part is considered medically necessary for venous malformations for preoperative assessment to evaluate the extent of malformation and their relationship to normal structures.
- MRA or CTA has a limited role in evaluating most venous malformations but is considered medically necessary (contrast as requested of the affected body part) if MRI or CT is equivocal and the results will impact acute management decisions.
- CT can also be used to characterize venous malformations and their relationship to normal structures but is generally not as accurate as MRI.
  - CT with contrast of the affected body part is considered medically necessary when MRI is inconclusive or contraindicated.

Clinical changes and monitoring treatment

MRI without contrast or without and with contrast of the affected body part is considered medically necessary for preoperative assessment of venous malformations.

CT Chest with contrast with PE protocol (CPT® 71260) or CTA Chest (CPT® 71275) is medically necessary to evaluate for suspected pulmonary embolism in individuals with Klippel-Trenaunay syndrome and CLOVES syndrome.

Surveillance

Annual surveillance imaging is medically necessary for venous malformations located in body areas where growth could cause significant organ dysfunction or functional impairment.

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Evidence Discussion

Venous malformations are slow-flow lesions characterized by dilated venous spaces and a normal arterial component. They are soft, compressible, non-pulsatile lesions that are usually blue to deep purple in color. Lesions can range from very small to large infiltrating ones. Some may change size with Valsalva. These lesions can enlarge over time and become painful when associated with thrombophlebitis (Bertino & Hawkins, 2023).

Venous malformations are most commonly sporadic and isolated lesions; however, they may also occur as part of a spectrum of congenital and genetic syndromes, including Klippel–Trénaunay syndrome, Blue Rubber Bleb Nevus syndrome, Maffucci syndrome, Proteus syndrome, Bannayan–Riley–Ruvalcaba syndrome, Parkes–Weber syndrome, and CLOVES syndrome (Edmondson & Kalish, 2015; Ozturk Durmaz et al., 2022; Wang et al., 2017; Lasso Andrade et al., 2021).

Several of these syndromic conditions—particularly those within the PIK3CA-related overgrowth spectrum—are associated with complex venous anomalies and abnormal vascular architecture that predispose patients to thromboembolic complications (Keppler-Noreuil et al., 2019).

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Capillary Malformations (PEDPVD-2.4)

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Imaging Indications for Capillary Malformations

Criteria

Initial Imaging

- MRI (without contrast or without and with contrast) is considered medically necessary to evaluate occult underlying neurologic structures associated with encephalocele, spinal dysraphism, or Sturge-Weber syndrome.

Evidence Discussion

Capillary malformations including Nevus simplex (NS) and Port wine birthmarks (PWBs) are characterized by a collection of small vascular channels in the dermis and generally do not require advanced imaging because the diagnosis is made clinically. However, MRI is considered medically necessary to evaluate underlying neurologic structures in specific cases, such as suspected Sturge-Weber syndrome (Bertino & Hawkins, 2023). Additional imaging is not considered medically necessary in the absence of other complex associated clinical findings such as Sturge-Weber syndrome (SWS) and Klippel-Trenaunay syndrome (KTS) (Paradiso & Shah, 2024).

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Arteriovenous Malformations (AVMs) and Fistulas (PEDPVD-2.5)

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Imaging Indications for AVMs and Fistulas

Criteria

Initial Imaging

- Ultrasound with Doppler is considered medically necessary as an initial examination for superficial lesions.
- MRI without contrast or without and with contrast of the affected body part is also considered medically necessary to evaluate the extent of AVMs and their relationship to normal structures.
- MRA (contrast as requested) of the affected body part is considered medically necessary for evaluation of known AVMs.
- It is unusual for both MRI and MRA to be necessary for routine treatment response or surveillance imaging of AVMs, but both are considered medically necessary for preoperative planning.
- CT and CTA can also be used to characterize AVMs and their relationship to normal structures but is generally not better than MRI and has associated radiation risks.
  - CT with contrast and/or CTA (contrast as requested) of the affected body part is considered medically necessary when MRI and/or MRA is inconclusive or contraindicated.

Clinical changes and monitoring treatment

MRI or MRA (contrast as requested) of the affected body part is considered medically necessary for evaluation of treatment response.

It is unusual for both MRI and MRA to be necessary for routine treatment response or surveillance imaging of AVMs, but both may be considered medically necessary for preoperative planning.

CT with contrast and/or CTA (contrast as requested) of the affected body part is considered medically necessary when MRI and/or MRA is inconclusive or contraindicated.

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Surveillance

MRI or MRA (contrast as requested) of the affected body part is considered medically necessary for annual surveillance of known AVMs located in body areas where growth could cause significant organ dysfunction or functional impairment.

Note:

For imaging indications specific to pulmonary AVM see **Pulmonary Arteriovenous Malformations (PEDCH-14.2)** in the Pediatric Chest Imaging guidelines, and for imaging indications specific to cerebral AVM see **Pediatric Intracranial Arteriovenous Malformations (AVM) (PEDHD-10.2)** in the Pediatric Head Imaging guidelines.

Evidence Discussion

Arteriovenous malformations (AVMs) and arteriovenous fistulas (AVFs) are high-flow vascular anomalies characterized by direct arteriovenous shunting in the absence of a normal intervening capillary bed (Shen et al., 2023; Le et al. 2025).

Both lesions may demonstrate an aggressive clinical course related to high-flow hemodynamics and typically present as a warm, erythematous, pulsatile mass accompanied by a palpable thrill or audible bruit due to turbulent flow (Shen et al., 2023).

Although these vascular anomalies are congenital and often present at birth, they frequently remain clinically quiescent early in life and may enlarge or become symptomatic during periods of hormonal change, particularly in adolescence (Shen et al., 2023).

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Vascular Tumors (PEDPVD-2.6)

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Imaging Vascular Tumors

Criteria

Initial imaging

Any or all of the following imaging of the affected body part is considered medically necessary for the initial imaging and characterization of vascular tumors:

- Ultrasound with Doppler an initial examination
- MRI without contrast or without and with contrast to determine the extent of arteriovenous malformations and their relationship to normal structures
- MRA (contrast as requested) of the affected body part is considered medically necessary for evaluation.

CT with contrast and/or CTA (contrast as requested) of the affected body part is considered medically necessary when MRI and/or MRA is inconclusive or contraindicated.

Clinical changes and monitoring treatment

For changes in clinical status (symptoms or exam findings) related to the vascular tumor either of the following imaging is considered medically necessary:

- MRI without contrast or without and with contrast of the affected body to evaluate treatment response
- MRA (contrast as requested) of the affected body part

For preoperative planning both MRI and MRA (as requested) of the affected body part are considered medically necessary.

CT with contrast and/or CTA (contrast as requested) of the affected body part is considered medically necessary when MRI and/or MRA is inconclusive or contraindicated.

Surveillance imaging

- MRA (contrast as requested) of the affected body part is considered medically necessary for the surveillance of known vascular tumors.

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- Imaging of vascular tumors with both MRI and MRA for routine treatment response or surveillance is not considered medically necessary.
- CT with contrast and/or CTA (contrast as requested) of the affected body part is considered medically necessary when MRI and/or MRA is inconclusive or contraindicated.

Evidence Discussion

Vascular tumors comprise a heterogeneous group of neoplastic lesions arising from endothelial cells and encompass benign, intermediate (locally aggressive or borderline), and malignant entities with widely variable clinical behavior (Hinen et al., 2020).

According to the International Society for the Study of Vascular Anomalies (ISSVA) classification, benign vascular tumors include lesions such as infantile hemangiomas and epithelioid hemangiomas, while intermediate tumors comprise entities such as kaposiform hemangioendothelioma and Kaposi sarcoma, and malignant tumors include epithelioid hemangioendothelioma and angiosarcoma of soft tissue (Hinen et al., 2020; Luzar et al., 2020; Zhou et al., 2026).

These tumors demonstrate a broad clinical spectrum, ranging from self-limited proliferative lesions of infancy to aggressive vascular sarcomas with significant metastatic potential, underscoring the importance of accurate classification for diagnosis, prognosis, and management (Hinen et al., 2020).

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Vasculitis (PEDPVD-3)

Guideline

Large Vessel Vasculitis (PEDPVD-3.2)
Medium Vessel Vasculitis (PEDPVD-3.3)
Small Vessel Vasculitis (PEDPVD-3.4)
References (PEDPVD-3)

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Large Vessel Vasculitis (PEDPVD-3.2)

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Imaging Indications

Criteria

Initial imaging

- ANY of the following modalities is considered medically necessary for the initial evaluation of Takayasu arteritis:
  - MRA of the affected body area(s) (contrast as requested)
  - CTA of the affected body area(s) (contrast as requested)
  - Ultrasound with Doppler of the affected body area(s)

Clinical changes and monitoring treatment

- In individuals being treated with systemic therapy, imaging (MRA or CTA or US) of the affected areas is considered medically necessary every 3 months to monitor active treatment for response.

Surveillance

- Imaging with MRA or CTA or US of the affected areas is medically necessary annually for surveillance of known involved body areas to detect progressive vascular damage that may require intervention.

Evidence Discussion

Takayasu arteritis is the most common form of large-vessel vasculitis in the pediatric population, despite its overall rarity.

In general, primary systemic vasculitides occur far less frequently in children than in adults, with only a few entities (such as IgA vasculitis and Kawasaki disease) being relatively common in younger patients.

Although differences exist in epidemiology and clinical presentation, the fundamental diagnostic approaches and therapeutic strategies for systemic vasculitis are broadly similar across pediatric and adult populations and are often extrapolated between age groups (Aeschlimann, Yeung, & Laxer, 2022).

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Medium Vessel Vasculitis (PEDPVD-3.3)

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Imaging Indications

- Some children who have had COVID 19 develop a severe inflammatory disease that can present in a similar way to Kawasaki disease or toxic shock syndrome. This syndrome has been defined by the US Centers for Disease Control and Prevention as multisystem inflammatory syndrome in children (MIS-C). See **Multisystem Inflammatory Syndrome in Children (MIS-C) (PEDCD-12)** in the Pediatric Cardiac Imaging Guideline.
- Imaging guidelines for Kawasaki Disease- see **Kawasaki Disease (PEDCD-6)** in the Pediatric Cardiac Imaging Guideline.

Criteria

Initial Imaging for Polyarteritis Nodosa

- For evaluation of polyarteritis nodosa:
  - ANY of the following modalities are considered medically necessary for the initial evaluation:
    - MRA of the affected body area(s) (contrast as requested)
    - CTA of the affected body area(s) (contrast as requested)
    - Ultrasound with Doppler of the affected body area(s)

Clinical Changes and Monitoring Treatment for Polyarteritis Nodosa

- For evaluation of polyarteritis nodosa:
  - MRA or CTA or US of the affected body part is considered medically necessary every 3 months during active treatment with systemic therapy for treatment response.

Surveillance Imaging for Polyarteritis Nodosa

- MRA or CTA or US of the affected body part is considered medically necessary annually for surveillance of known involved body areas to detect progressive vascular damage that may require intervention.

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Evidence Discussion

Polyarteritis nodosa and Kawasaki Disease are the primary medium vessel vasculitides occurring in children.

Polyarteritis nodosa and Kawasaki disease are the principal medium-vessel vasculitides encountered in children, each characterized by inflammation of medium-sized arteries and distinct but complementary imaging profiles (Aeshlimann, Yeung & Laxer, 2022).

From an imaging perspective, Kawasaki disease most commonly involves the coronary arteries, where echocardiography serves as the first-line modality to detect coronary artery dilatation and aneurysm formation, with advanced imaging (CT or MR angiography) used in select cases for further vascular assessment. In contrast, polyarteritis nodosa typically affects systemic medium-sized muscular arteries, and imaging, particularly catheter-based angiography or CT/MR angiography demonstrates characteristic findings such as microaneurysms, stenoses, and occlusions in visceral arterial beds (e.g., renal and mesenteric vessels) (Aeshlimann, Yeung, & Laxer, 2022).

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Small Vessel Vasculitis (PEDPVD-3.4)

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Imaging Indications Small Vessel Vasculitis

Criteria

- Advanced imaging is not sensitive enough to detect changes in small vessels and is **not** considered medically necessary for primary assessment of any small vessel vasculitis.
- End-organ damage occurs with several of the small vessel vasculitides. Advanced imaging is considered medically necessary for the following:
  - Immune complex associated small-vessel vasculitis [immunoglobulin A associated vasculitis] (IgA vasculitis, also known as Henoch-Schönlein Purpura (HSP)) is the most common vasculitis of childhood, mainly involving small blood vessels. Ultrasound abdomen (CPT® 76700) is commonly used to evaluate possible gastrointestinal complications (including bowel wall edema and hemorrhage, and intussusception) in known or suspected HSP, and should be approved when requested for that indication.
    - Doppler ultrasound of the affected body part (most commonly abdomen) is considered medically necessary in the following circumstances:
      - New or worsening clinical symptoms affecting the body area requested
      - To assess response to medical therapy when a change in treatment regimen is being considered
      - Annually to evaluate the extent of disease
  - Granulomatosis with polyangiitis (GPA, formerly known as Wegener's granulomatosis):
    - CT Sinuses (CPT® 70486) and/or CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is considered medically necessary in the following circumstances:
      - New or worsening clinical symptoms affecting the body area requested
      - To assess response to medical therapy when a change in treatment regimen is being considered
      - Annually to evaluate the extent of disease
  - Eosinophilic granulomatosis with polyangiitis (EGPA, formerly known as Churg-Strauss Syndrome):
    - CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is considered medically necessary in the following circumstances:

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- New or worsening clinical symptoms affecting the body area requested
- To assess response to medical therapy when a change in treatment regimen is being considered
- Annually to evaluate the extent of disease

Evidence Discussion

Immunoglobulin A (IgA) vasculitis, formerly known as Henoch–Schönlein purpura, is the most common systemic vasculitis in children and predominantly affects small vessels (Ercan Emeral et al, 2025).

Imaging plays a key role in the evaluation of disease complications, particularly gastrointestinal involvement, which is common in pediatric cases. Ultrasonography, including Doppler techniques, is typically the first-line modality and can demonstrate bowel wall thickening, edema, and altered vascularity, while computed tomography (CT) provides additional detail in more severe or equivocal presentations, such as identifying multifocal bowel involvement, mesenteric edema, or complications like intussusception (Shuai et. al., 2025).

These imaging modalities are also useful for assessing disease severity and monitoring therapeutic response over time, particularly in patients with significant gastrointestinal manifestations.

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Disorders of the Aorta and Visceral Arteries (PEDPVD-4)

Guideline

Thoracic Aortic Disease (PEDPVD-4.1)
Aortic Congenital Vascular Malformations (PEDPVD-4.2)
Visceral Artery Aneurysms (PEDPVD-4.3)
References (PEDPVD-4)

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Thoracic Aortic Disease (PEDPVD-4.1)

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Imaging Indications for Thoracic Aortic Disease

Criteria

Familial Aortopathies

- For aortopathies such as the following:
  - Marfan
  - Ehlers-Danlos (EDS)- a genetic mutation known to predispose to aortic aneurysms/ dissections (TGFBR1, TGFBR2, FBN1, ACTA2, or MYH11)
  - Loeys-Dietz
  - Familial thoracic aneurysm and dissections
- Screening: for Family history with first-degree relative of aortopathy
  - Asymptomatic individuals with no signs or symptoms of disease, whose first-degree relative has no definitive gene defect, can have screening echo (TTE) annually.
- Initial workup: Individuals with suspected aortopathies (gene positive, physical exam positive, or other findings) or definite disease associated with aortopathy
  - Echocardiogram (TTE) at the time of evaluation.
  - If the consideration is for Loeys-Dietz any of the following are considered medically necessary in addition to the TTE at the time of work up:
    - MRA or CTA Head
    - MRA or CTA Neck
    - MRA or CTA Chest
    - MRA or CTA Abdomen and Pelvis
    - MRA or CTA of area of concern when there is an incidental finding on other imaging
- Surveillance: Suspected or known disease but **normal** aortic imaging:
  - Individuals with suspected genetic aortopathies but no disease can have an echocardiogram to assess for change:
    - At 6 months
    - Then annually
  - Individuals with Loeys-Dietz can be imaged with any of the following:
    - Echocardiogram

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        - MRA or CTA of (any or all):
            - Head
            - Neck
            - Chest
            - Abdomen
            - Pelvis
    - Individuals with Loeys-Dietz can be imaged with the above at the following intervals:
        - At 6 months
        - Then annually
- Surveillance: Suspected disease and **previous abnormal** imaging
    - Individuals with abnormal thoracic imaging can be imaged with (both):
        - Echocardiogram
        - CTA or MRA of (any):
            - Chest
            - Abdomen
            - Pelvis
            - Head (Loeys-Dietz)
            - Neck (Loeys-Dietz)
    - The above imaging is considered medically necessary as follows:
        - At the time of diagnosis
        - In 6 months after diagnosis (if older than 2 years)
        - Then as follows based on the individual's age:
            - Individual's age 0 to 2 years:
                - Every 3 months
            - Individual's age 3 to 12 years:
                - Every 6 months
            - Individual's age 13 years and older:
                - Every 12 months (if <4.5 or < 0.5 cm growth per year)
                - Every 6 months if ≥4.5 or ≥0.5 cm growth per year, or any Loeys-Dietz patient)
    - If the diameter z score is increased, then a repeat study can be done prior to the next allowed study, to assess for rate of change
- If there are symptoms of dissection, any or all of the following are considered medically necessary:
    - Echo
    - CTA or MRA of (any or all):
        - Chest
        - Abdomen

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    - Pelvis
- For pediatric individual with dissection, imaging per vascular surgery and cardiology or any provider in consultation with vascular surgery at **any** interval.
- Miscellaneous syndromes with potential aortopathy as major feature of congenital heart disease
    - Individuals with Turner syndrome see section **Aortic disease in Turner Syndrome (CD-11.2.10)** in the Cardiac Imaging Guideline
    - Williams syndrome See section **LVOT lesions (PEDCD-2.4.10)** in the Pediatric Cardiology Imaging Guideline
    - Individuals with congenital heart disease would be managed based on **Imaging and Surveillance per Congenital lesion (PEDCD-2.4)** in the Pediatric Cardiology Imaging Guideline
- Miscellaneous disorders that can affect the aorta such as osteogenesis imperfecta, homocystinuria, polycystic kidney disease, pseudoxanthoma elasticum, and Hurler syndrome.
    - Screening echocardiogram yearly.
    - If positive findings, follow protocol for aortic root dilatation.
- Follow-up of thoracic aortic abnormalities related to the following conditions are addressed in other imaging guidelines:
    - Coarctation of the Aorta- See **Aortic Coarctation and IAA (interrupted aortic arch) (PEDCD-2.4.11)** in the Pediatric Cardiac Imaging Guidelines
    - Congenital rubella syndrome- See **Imaging and Surveillance per Congenital lesion (PEDCD-2.4)** in the Pediatric Cardiac Imaging Guidelines
    - Kawasaki Syndrome- See **Kawasaki Disease (PEDCD-6)**
    - Neurofibromatosis- See **General Guidelines (PEDCD-1.0)** in the Pediatric Cardiac Imaging Guidelines

Evidence Discussion

Familial (heritable) aortopathies encompass a spectrum of genetically mediated disorders, including Marfan syndrome, Ehlers–Danlos syndrome (particularly the vascular subtype), Loeys–Dietz syndrome, and familial thoracic aortic aneurysm and dissection (FTAAD). These conditions are characterized by progressive aortic dilation and an increased risk of aneurysm formation, dissection, and rupture, often occurring at a younger age compared with degenerative aortic disease (Fletcher et al., 2020).

Multimodality imaging plays a central role in the diagnosis, risk stratification, and longitudinal surveillance of these disorders. Transthoracic echocardiography (TTE) is routinely used as a first-line modality to assess the aortic root and proximal ascending aorta, given its accessibility and ability to provide serial measurements over time (Evangelista et al., 2023).

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Cross-sectional imaging techniques, including computed tomography angiography (CTA) and magnetic resonance angiography (MRA), provide comprehensive evaluation of the entire aorta and its branch vessels. CTA offers high spatial resolution and rapid acquisition, making it particularly useful for detecting aneurysms and dissections, while MRA is advantageous for long-term monitoring due to the absence of ionizing radiation, especially in younger patients requiring repeated imaging (Evangelista et al., 2023).

Current evidence emphasizes the importance of regular imaging surveillance in individuals with heritable aortopathies to monitor disease progression, guide timing of surgical intervention, and reduce the risk of life-threatening complications such as aortic dissection (Evangelista et al., 2023).

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Aortic Congenital Vascular Malformations (PEDPVD-4.2)

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Imaging Indications for Aortic Congenital Vascular Malformations

Criteria

Imaging for Aortic Congenital Vascular Malformation

Description	CPT®
CT Chest with contrast	71260
CTA Chest	71275
MRA Chest	71555
Cardiac MRI without contrast	75557
Cardiac MRI without and with contrast	75561

Any of the imaging in the **above table** is considered medically necessary for the initial diagnosis of Congenital Aortic Vascular Malformation.

Vascular rings may impact both the esophagus and trachea. CTA or MRA of the Neck is considered medically necessary to evaluate the relationship of the aortic arch to the trachea and esophagus for surgical planning.

Evidence Discussion

Congenital Aortic Vascular Malformations can be asymptomatic or can present with impact on breathing or swallowing when there is associated compression from vascular rings. Vascular rings may impact both the esophagus and trachea. Imaging modalities such as cardiac MRI, MRA, CT, and CTA are used to evaluate these malformations and their impact on surrounding structures (Priya et al., 2018).

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Visceral Artery Aneurysms (PEDPVD-4.3)

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Imaging Indications for Visceral Artery Aneurysms

Criteria

- Visceral artery imaging indications in pediatric individuals are identical to those for adult individuals. See **Visceral Artery Aneurysm (PVD-6.5)** in the General Peripheral Vascular Disease Imaging Guidelines.

Treatment is generally considered medically necessaryfor visceral aneurysms ≥2cm. Imaging of visceral artery aneurysms for initial evaluation or for treatment planning is considered medically necessary as follows:

- Initial imaging of calcifications seen on plain film imaging suspicious for visceral artery aneurysms (spleen, kidney, liver or intestines) with ultrasound (CPT® 76700, 76705, 93975, 93976, 93978, or 93979), **or** CTA Abdomen (CPT® 74175), **or** CT Abdomen with contrast (CPT® 74160)
- MRA Abdomen (CPT® 74185) without contrast in place of CTA or CT Abdomen in pediatric individuals or when there is a contraindication to contrast materials (i.e., renal insufficiency, contrast allergy, pregnancy)
- Ultrasound (CPT® 76700,76705, 93975, 93976, 93978, or 93979) **or** CTA Abdomen (CPT® 74175) **or** CT Abdomen with contrast (CPT® 74160) is considered medically necessary for further monitoring based on the intervals below or **as determined by a vascular specialist or any provider in consultation with a vascular specialist**:
  - Splenic artery aneurysms:
    - <20mm can be imaged every three years
    - 20mm to 29mm can be imaged annually
    - If ≥30mm, they should be referred for treatment, either stent, excision or splenectomy
  - For all other visceral artery aneurysms:
    - Initial evaluation with six-month follow-up for one year
    - Further follow-up annually if no significant enlargement is seen
- CTA Abdomen (CPT® 74175), MRA Abdomen (CPT® 74185), or CT Abdomen with contrast (CPT® 74160) is considered medically necessary following stent placement at:
  - 1 month
  - 6 months

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- 12 months
- Then every year

Evidence Discussion

Visceral artery aneurysms (VAAs) are uncommon vascular lesions, accounting for a small proportion of all arterial aneurysms, but they carry substantial clinical significance due to the risk of rupture and associated mortality. Although aneurysmal disease most frequently involves large vessels, involvement of medium and small caliber arteries can occur, including the visceral arterial circulation. These lesions may be associated with underlying connective tissue disorders, vasculopathies, or other genetic conditions, although many cases arise without a clearly identifiable etiology (Leone et al., 2025).

Most VAAs are clinically silent and are increasingly identified incidentally with the widespread use of abdominal imaging. Imaging indications and diagnostic approaches in pediatric patients are generally similar to those in adults, with ultrasonography, computed tomography angiography (CTA), and magnetic resonance angiography (MRA) serving as primary modalities for detection, characterization, and surveillance (Chaer et al., 2020).

CTA is widely regarded as the preferred initial modality for detailed evaluation of visceral aneurysms because of its high spatial resolution and ability to delineate vascular anatomy and aneurysm morphology. MRA serves as a valuable alternative in patients requiring minimized radiation exposure, particularly in younger populations or those with contraindications to iodinated contrast. Ultrasound, including duplex Doppler, may be useful for initial detection and longitudinal follow up in select cases; however, its diagnostic utility is often limited by anatomic factors such as overlying bowel gas, body habitus, and the deep retroperitoneal location of many visceral vessels. Consequently, the selection of an optimal imaging modality for surveillance should be individualized and guided by the quality of initial imaging, lesion location, and the ability of a given technique to provide reliable and reproducible measurements (Chaer et al., 2020).

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Infantile Hemangiomas (PEDPVD-5)

Guideline

General Considerations (PEDPVD-5.1)
Multiple Infantile Hemangiomas (PEDPVD-5.2)
PHACE(S) Syndrome (PEDPVD-5.3)
LUMBAR Syndrome (PEDPVD-5.4)
References (PEDPVD-5)

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General Considerations (PEDPVD-5.1)

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Most infantile hemangiomas do not require any imaging. Ultrasound with Doppler can be used when the diagnosis is uncertain, or with high-risk clinical considerations. Other general imaging considerations for other vascular neoplasms regarding MRI, MRA, CT, and CTA also apply to infantile hemangiomas. See **Imaging vascular tumors (PEDPVD-2.6)** .

- Multiple (5 or more) infantile hemangiomas can be associated with hepatic hemangiomas with risk potential for high-output cardiac failure and other risks see **Multiple Infantile Hemangiomas (PEDPVD-5.2)**.
- High-output cardiac failure can also be caused rarely by large cutaneous infantile hemangiomas. Affected infants may present with faltering weight (“failure-to-thrive”), a hyperdynamic precordium, tachycardia, bounding pulses with a widened pulse pressure, and a palpable thrill and/or audible bruit over the hemangioma. This is an indication for cardiac evaluation, including echocardiography (CPT® 93303 ordered with CPT® 93320 and CPT® 93325).
- Life threatening risk of airway obstruction is associated with infantile hemangiomas of the lower face (“beard distribution”), or of the anterior neck, or of the oral and/or pharyngeal mucosa.
- Location-associated functional impairment can be found with periocular infantile hemangiomas larger than 1 cm (impairing vision), or infantile hemangiomas involving lip(s) or oral cavity (impairing feeding).
- Ulceration can occur with profuse bleeding that can be life threatening.
- Disfigurement risk is increased with large (5 cm or larger) infantile hemangiomas, facial or scalp infantile hemangiomas, and breast infantile hemangiomas in female infants.
- An infantile hemangioma at least 2.5 cm in diameter overlying the lumbar spine or sacrum is an indication to do a spinal ultrasound (under 6 months of age) and/or MRI Lumbar Spine without contrast (CPT® 72148) or MRI Lumbar Spine without and with contrast (CPT® 72158).
- Infantile hemangiomas 5 cm or larger in size have an increased risk of extracutaneous structural abnormalities.
- Other high-risk indications include Syndromes or Associations with extracutaneous structural changes: for “PHACE(S) syndrome” See **Imaging Indications for PHACE(s) Syndrome**, and for “LUMBAR syndrome” See **Imaging Indications for LUMBAR Syndrome**.

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Evidence Discussion

Infantile Hemangiomas are the most common benign tumor of childhood, occurring in close to 5% of infants. Infantile Hemangiomas typically have a phase of rapid and significant growth between 1 month and 3 months of age; growth is usually completed by 5 months of age. Gradual involution then occurs, completed in 90% by age of 4 years but with residual skin changes frequently persisting. Though usually not needed for diagnosis, biopsy can be done when needed to identify unique markers not found on other vascular tumors.

When treatment is needed, imaging may be used to monitor response; consultation with a hemangioma specialist may be useful in guiding evaluation, treatment, and follow-up. The 2019 Clinical Practice Guideline of the American Academy of Pediatrics states "Unlike many diseases, management of IHs is not limited to 1 medical or surgical specialty. A hemangioma specialist may have expertise in dermatology, hematology-oncology, pediatrics, facial plastic and reconstructive surgery, ophthalmology, otolaryngology, pediatric surgery, and/or plastic surgery, and his or her practice is often focused primarily or exclusively on the pediatric age group."

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Multiple Infantile Hemangiomas (PEDPVD-5.2)

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Criteria

- Multiple (5 or more) hemangiomas is an indication for Ultrasound with Doppler exam of the liver (CPT® 76700):
  - Initial imaging to look for hepatic hemangiomas
  - Repeat doppler ultrasound abdomen:
    - Monitor hepatic hemangiomas for progression
    - Monitor response to treatment.

Evidence Discussion

Multiple (5 or more) hemangiomas- though hepatic hemangiomas can be asymptomatic, they rarely can cause a high flow rate that can cause high-output cardiac failure and can be potentially fatal. "Diffuse" hepatic infantile hemangiomas are a rare subset of hepatic hemangiomas at high-risk for morbidity and mortality; affected infants usually present before 4 months of age with severe hepatomegaly, which can lead to lethal abdominal compartment syndrome with compromised ventilation, renal failure caused by renal vein compression, or compromise of inferior vena cava blood flow to the heart. Hepatic hemangiomas can also inactivate (via deiodination) thyroid hormones, causing risk of severe hypothyroidism.

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PHACE(S) Syndrome (PEDPVD-5.3)

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Imaging Indications for PHACE(s) Syndrome

Criteria

Initial Imaging

- Initial diagnostic imaging is considered medically necessary when PHACE(S) syndrome is suspected by clinical findings including **any** of the following:
  - Infantile hemangioma ≥5 cm diameter on the face, scalp, and/or neck.
  - Infantile hemangioma <5cm on face, scalp, or neck in the setting of one or more major anomalies associated with PHACE(S) syndrome (i.e., coarctation of the aorta or midline ventral defect).
  - Infantile hemangioma on upper chest or proximal upper extremity ≥5 cm with no visible facial infantile hemangioma with PHACE(S) syndrome in the setting of one or more major anomalies associated with PHACE(S) syndrome (i.e., coarctation of the aorta or midline ventral defect).
  - Large intraorbital infantile hemangioma.
- Initial imaging for suspected PHACE(S) syndrome includes **any** of the following:
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553)
  - MRI Orbits without contrast (CPT® 70540) or MRI Orbits without and with contrast (CPT® 70543)
  - MRA Head without contrast (CPT® 70544) or MRA Head without and with contrast, (CPT® 70546)
  - MRA Neck may be done either without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549)
  - MRA Chest (CPT® 71555)
  - Transthoracic echocardiogram (CPT® 93303 with CPT® 93320 and CPT® 93325)
    - Cardiac MRI (CPT® 75557 or CPT® 75561) is considered medically necessary if abnormalities are identified on echocardiogram.
  - MRI Chest without contrast (CPT® 71550) or MRI Chest without and with contrast (CPT® 71552) is considered medically necessary if other clinical information or imaging shows involvement of the aorta.

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Surveillance

Repeat imaging is considered medically necessary when results will impact clinical management of the individual based on the results of the initial clinical and imaging assessment and any subsequent clinical changes, or when high-risk findings have been identified by clinical evaluation such as any of the following:

- Evidence of past arterial stroke
- Arterial stenosis or occlusions, with or without moyamoya-like vascular changes
- Structural brain changes, with neurosurgical evaluation clarifying the need for follow-up.
- Changes in the aortic arch, coarctation of the aorta, and congenital cardiac anomalies, with pediatric cardiology evaluation clarifying the need for follow-up see **Imaging and Surveillance per Congenital Lesion (PEDCD-2.4)** in the Pediatric Cardiac Imaging Guidelines

Evidence Discussion

"PHACE" (Posterior fossa malformations, Hemangiomas, Arterial anomalies, Coarctation of the aorta and Cardiac defects, and Eye abnormalities) syndrome or association (or "PHACE(S)" syndrome when also associated with sternal cleft and/or supraumbilical raphe) is frequently suspected when an infant has a large (5 cm in diameter or larger) infantile hemangioma of the face, scalp, or neck (risk of PHACE(S) Syndrome is then approximately 30%).

In rare cases, the face or scalp is not involved, with a large infantile hemangioma located on the torso and/or upper extremity instead. Cerebrovascular anomalies, present in more than 90% of individuals with PHACE(S) syndrome, are the most common extracutaneous feature of the syndrome, followed by cardiac anomalies (67%) and structural brain anomalies (about 50%).

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LUMBAR Syndrome (PEDPVD-5.4)

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Imaging Indications for LUMBAR Syndrome

Criteria

- "LUMBAR syndrome" is reasonably suspected in a child with a large (5 or more cm in diameter) infantile hemangioma of any lumbosacral or perineal region or lower extremity. The following imaging is considered medically necessary:
  - Ultrasound spine (CPT® 76800) in infants up to 6 months of age, abdomen (CPT® 76700), and pelvis (CPT® 76856), with color Doppler.
  - MRI Lumbar Spine without contrast (CPT® 72148) or without and with contrast (CPT® 72158) at 3 to 6 months of age, or earlier when either findings on an Ultrasound exam are inadequate or when requested by a hemangioma specialist or any provider in consultation with a hemangioma specialist.
  - MRI of other relevant spinal level (relevance based on proximity of observed infantile hemangiomas larger than 5 cm) without contrast or MRI of the relevant spinal level without and with contrast.
  - When ultrasound findings are inadequate and/or when recommended by a hemangioma specialist or any provider in consultation with a hemangioma specialist:
    - MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) **and/or**
    - MRI Abdomen without contrast (CPT® 74181) or without and with contrast (CPT® 74183).
  - MRA Abdomen CPT® 74185 and/or Pelvis CPT® 72198, is considered medically necessary based on proximity of infantile hemangioma(s) at least 5 cm in diameter and/or other clinical evidence of vascular involvement, and/or when recommended by a hemangioma specialist or any provider in consultation with a hemangioma specialist.
  - Infantile hemangioma of the lower extremity that is at least 5 cm in diameter is an indication for MRI of the relevant portion of the lower extremity without contrast (CPT® 73718) or lower extremity without and with contrast (CPT® 73720) and/or lower extremity joint without contrast (CPT® 73721) or lower extremity joint without and with contrast (CPT® 73723).
  - When there is extensive lower extremity involvement with infantile hemangiomas the following are all considered medically necessary:

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- MRA (for both arterial and venous phase imaging) Abdomen
- MRA Pelvis
- MRA Lower extremities
- Note: this should be reported as CPT® 74185 and CPT® 73725; the CPT® code for MRA Pelvis (CPT® 72198) should not be included in this circumstance.

Evidence Discussion

The acronym "LUMBAR syndrome" refers to the association of lower body infantile hemangiomas of at least 5 cm in size (and other cutaneous defects), urogenital anomalies and ulceration, myelopathy (lipomyelocele/lipo-myelomeningocele and/or tethered spinal cord), bony deformities, anorectal malformations and arterial anomalies, and renal anomalies. Though not exclusively true, there is a general regional correlation between the location of the cutaneous large infantile hemangioma(s) with underlying structural anomalies.

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General Guidelines (PEDSP-1.0)

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Criteria

- A pertinent clinical evaluation since the onset or change in symptoms, including a detailed history, physical examination with a thorough neurologic examination, appropriate laboratory studies and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) can serve as a pertinent clinical evaluation.
  - A thorough neurologic examination should include results of manual motor testing, specific dermatomal distribution of altered sensation, reflex examination, nerve root tension signs (e.g., straight leg raise test, slump test, femoral nerve tension test), and documentation of any specific radicular features.
- For those spinal conditions/disorders for which the Spine Imaging Guidelines require a plain x-ray of the spine prior to consideration of an advanced imaging study, the plain x-ray must be performed after the current episode of symptoms started or changed and results need to be available to the requesting provider of the advanced imaging study.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the spine is not supported. Advanced imaging of the spine should only be approved in individuals who have documented active clinical signs or symptoms of disease involving the spine.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the spine are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Pediatric Spine Imaging Age Considerations (PEDSP-1.1)

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- Many conditions affecting the spine in the pediatric population have different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals under 19 years of age should be imaged according to the Pediatric Spine Imaging Guidelines if discussed. Any conditions not specifically discussed in the Pediatric Spine Imaging Guidelines should be imaged according to the General Spine Imaging Guidelines. Individuals 19 years of age or older should be imaged according to the General Spine Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Pediatric Spine Imaging Appropriate Clinical Evaluation (PEDSP-1.2)

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- See: **General Guidelines (PEDSP-1.0)**

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Pediatric Spine Imaging Modality General Considerations (PEDSP-1.3)

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Criteria

- MRI
  - MRI is the preferred modality for imaging the pediatric spine unless otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize individual movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this individual population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
    - Recent evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If multiple body areas are supported by these guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
- CT
  - CT is generally inferior to MRI for imaging the pediatric spine, but has specific indications in which it is the preferred modality listed in specific sections of these guidelines.

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        - CT is the imaging study of choice in the setting of trauma
        - CT should not be used to replace MRI in an attempt to avoid sedation unless it is listed as a recommended study in a specific guideline section.
    - Myelogram with post-myelogram CT imaging is rarely indicated in children except in certain limited indications (usually requested after specialist consultation), including:
        - Evaluation of spine in individuals with fixation hardware which limits utility of MRI.
        - Severe congenital scoliosis with inconclusive MRI.
        - Evaluation of nerve root avulsion in patients with a brachial plexus injury and inconclusive MRI.
        - Evaluation of paraspinal cyst to assess continuity with the subarachnoid space.
        - Coding note: CT of appropriate spinal level with or without contrast may be appropriate. If the radiologist performs the myelogram the exam should be coded with contrast. If a clinician performs the myelogram the exam should be coded without contrast.
- Ultrasound
    - Spinal canal ultrasound (CPT® 76800) describes the ultrasonic evaluation of the spinal cord (canal and contents) and should not be reported multiple times for imaging of different areas of the spinal canal.
    - Do not use CPT® 76800 for intraoperative spinal canal ultrasound as CPT® 76998 (intraoperative ultrasonic guidance) is the appropriate code in this circumstance.
    - Spinal canal ultrasound (CPT® 76800) is generally limited to infants up to 6 months of age because of the bone mass surrounding the spinal cord limits evaluation of the intraspinal contents in older infants.
        - **Exception:** the persisting acoustic window in children with posterior spinal defects of spinal dysraphism enables spinal canal ultrasound to be performed at any age (see: **Spinal Dysraphism (PEDSP-4)**).
        - In general, additional imaging studies of the spine are not indicated in asymptomatic individuals with normal spinal ultrasound findings.
- Nuclear Medicine
    - Nuclear medicine studies are rarely used in the evaluation of the spine, but are medically necessary in the following circumstances:
        - Evaluation of suspected loosening of orthopedic hardware when recent plain x-ray is nondiagnostic (see: **Nuclear Medicine (MS-28)**).
            - Bone scan (CPT® 78315) or
            - Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831) or
            - SPECT/CT (CPT® 78830 or CPT® 78832)
        - For suspected spondylolysis, see **Spondylosis (PEDSP-2.4)**

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  - Evaluation of back pain when no cause is demonstrated on MRI, see **Back and Neck Pain in Children Age 5 and Under (PEDSP-2.2)** or **Back and Neck Pain in Children Age 6 and Older (PEDSP-2.3)**
- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

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Pediatric Back and Neck Pain and Trauma (PEDSP-2)

Guideline

Introduction (PEDSP-2.1)
Back and Neck Pain in Children Age 5 and Under (PEDSP-2.2)
Back and Neck Pain in Children Age 6 and Older (PEDSP-2.3)
Spondylolysis (PEDSP-2.4)
Spine Pain Due to Infectious Causes (PEDSP-2.5)
Spine Pain Related To Trauma and Painless Spine Trauma (PEDSP-2.6)
References (PEDSP-2)

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Introduction (PEDSP-2.1)

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- Currently, only about 20% of back pain in children over age 5 is from a discoverable cause. Scoliosis, spondylitic disorders, Scheuermann disease, tumor, and trauma are the most common causes.
- Back pain in children under age 5 is uncommon and often reflects underlying serious disease when present.
- Disc herniations are rare in children, but become more frequent as activity increases during adolescence.

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Back and Neck Pain in Children Age 5 and Under (PEDSP-2.2)

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Criteria

- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- Advanced imaging is considered medically necessary in all individuals in this age group except those with mild and transient back pain.
  - MRI of the symptomatic spinal region is considered medically necessary.
    - Individuals in this age group will require sedation to complete MRI imaging. See: **Pediatric Spine Imaging Modality General Considerations (PEDSP-1.3)** for contrast and body area considerations.
  - CT without contrast of the symptomatic spinal region is considered medically necessary when:
    - plain x-rays suggest an isolated vertebral bone abnormality without any concern for spinal canal or cord abnormalities (which is rare in this age group)
    - a recent MRI does not provide sufficient detail of the bony anatomy to allow for acute patient care decision making
  - Bone scan is considered medically necessary for evaluation of suspected spinal fracture when x-ray is negative using any of the following CPT® code combinations:
    - CPT® 78300, CPT® 78305, or CPT® 78306 as a single study
    - CPT® 78315 or CPT® 78803 can be approved as a single study when stress fracture is suspected.
  - Bone scan is considered medically necessary for evaluation of suspected spondylolysis, or if recent spine MRI is inconclusive using any of the following CPT code combinations: SPECT bone scans are especially sensitive for detecting spondylolysis, revealing areas of bone turnover; and the findings are generally positive for a prolonged period.
    - CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, CPT® 78315, or CPT® 78803 as a single study
    - CPT® 78305 and CPT® 78803 concurrently
    - CPT® 78306 and CPT® 78803 concurrently

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Evidence Discussion

Prior to advanced imaging, a thorough history and physical examination, including neurologic assessment, should be performed, with this clinical evaluation considered medically necessary because most pediatric back pain is mechanical and self-limited (MacDonald et al., 2017). Clinical findings, rather than pain severity alone, distinguish benign presentations from those requiring further workup (León-Domínguez et al., 2023; Biagiarelli et al., 2019). When symptoms persist or worsen, advanced imaging may be considered medically necessary because pediatric individuals have a higher likelihood of identifiable structural pathology than adults with comparable complaints (Calloni et al., 2017; Expert Panel on Pediatric Imaging et al., 2025). MRI of the symptomatic spinal region should serve as the primary advanced imaging modality, with its use considered medically necessary due to its superior detection of infection, neoplasm, and disc pathology without ionizing radiation exposure (Ramirez et al., 2015; Saleh et al., 2021). CT without contrast should be reserved for an isolated bony abnormality without canal or cord concern, or when a recent MRI does not provide sufficient bony detail for acute care decision-making. In these circumstances, CT may be considered medically necessary despite radiation dose considerations in children (Kadom et al., 2018; McAlister et al., 2019). For a suspected fracture with negative x-rays, particularly when a stress fracture is suspected, bone scan may be considered medically necessary (Matesan et al., 2016). Bone scan may also be considered medically necessary for suspected spondylolysis or an inconclusive MRI because SPECT is especially sensitive for detecting pars interarticularis bone turnover before it becomes apparent on plain film or MRI, with findings remaining positive for a prolonged period (Tofte et al., 2017; Trout et al., 2015; Kim et al., 2018; Ledonio et al., 2017).

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Back and Neck Pain in Children Age 6 and Older (PEDSP-2.3)

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Criteria

Radicular back and neck pain is common in adult patients but is uncommon in adolescents and rare in children.

- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination including results of manual motor testing, the specific dermatomal distribution of altered sensation, reflex examination, and nerve root tension signs (e.g., straight leg raise test, slump test, femoral nerve tension test) and documentation of any specific radicular features, should be performed prior to considering advanced imaging.
- X-rays, while not required prior to conservative treatment, must be obtained before advanced imaging can be approved.
  - The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study.
- Advanced imaging is considered medically necessary following x-ray when one or more of the following pediatric “red flags” are present:
  - Accompanying systemic symptoms (fever, weight loss, etc.)
  - Functional disability (daily limitation in normal activities because of pain)
  - Pain which is extremely severe or worse at night
  - Constant or radicular pain lasting ≥4 weeks
  - Pain which worsens despite an attempt at symptomatic treatment
  - Neurological symptoms or abnormal neurological examination findings
  - An established diagnosis of cancer other than leukemia
  - Abnormal x-rays
  - Individuals having undergone spinal surgery
  - Associated bowel or bladder dysfunction
- In the absence of any “red flags”, a 4-week trial of provider-supervised conservative treatment (after the current set of symptoms or physical exam findings started or changed) should be attempted before advanced imaging is medically necessary.
  - It can be assumed that children who are being evaluated by a pediatric spine surgeon have failed a reasonable trial of conservative treatment under the care of the primary care provider, as this is by far the most common reason for such referrals.

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- X-rays of the involved regions should be obtained prior to advanced imaging in individuals with “red flag” findings, or who remain symptomatic after a 4-week trial of provider-supervised conservative treatment.
  - The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study.
- MRI without contrast of the symptomatic spinal region is considered medically necessary for the evaluation of pediatric spine pain, and should be approved unless one of the following conditions applies, in which case MRI without and with contrast is medically necessary:
  - Fever (≥100° F)
  - Clinical suspicion of infection (discitis, osteomyelitis, paraspinous or epidural abscess)
  - Physical examination or plain x-ray suggests a mass lesion
  - New or worsening pain in a patient with an established diagnosis of cancer
- CT without contrast of the symptomatic spinal region is considered medically necessary when:
  - the request is for re-evaluation of a known vertebral bony disorder
  - plain x-rays show spondylotic changes or suggest an isolated vertebral bone abnormality without any concern for spinal canal or cord abnormalities (which is rare in this age group)
  - a recent MRI does not provide sufficient detail of the bony anatomy to allow for acute individual care decision making
- Bone scan is considered medically necessary for evaluation of suspected spinal fracture when x-ray is negative, or if recent MRI is inconclusive using any of the following CPT® code combinations:
  - CPT® codes: CPT® 78300, CPT® 78305, or CPT® 78306 as a single study
  - CPT® 78315 or CPT® 78803 as a single study when stress fracture is suspected

Evidence Discussion

A detailed history and physical examination should precede advanced imaging and include manual motor testing, dermatomal sensory testing, reflex examination, and assessment of nerve root tension signs. This clinical evaluation is considered medically necessary to identify findings that may warrant further diagnostic workup (Calloni et al., 2017; MacDonald et al., 2017). Plain x-rays should generally be obtained before advanced imaging and are considered medically necessary for identifying isolated bony abnormalities and spondylotic changes that may guide subsequent evaluation (Kadom et al., 2018; McAlister et al., 2019). Following x-ray, advanced imaging may be considered medically necessary when a pediatric red flag is present. Red flags include systemic symptoms, functional disability, severe or nocturnal pain, constant

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or radicular pain lasting four weeks or longer, pain unresponsive to symptomatic treatment, neurologic findings, an established cancer diagnosis other than leukemia, abnormal x-rays, prior spinal surgery, or bowel or bladder dysfunction. These findings are associated with a greater likelihood of identifiable structural pathology in children with persistent symptoms (Calloni et al., 2017; Expert Panel on Pediatric Imaging et al., 2025). In the absence of red flags, a four-week trial of provider-supervised conservative treatment should be completed before advanced imaging. This period of conservative management is considered medically necessary because most pediatric back and neck pain is mechanical and self-limited (MacDonald et al., 2017; León-Domínguez et al., 2023; Biagiarelli et al., 2019). MRI without contrast of the symptomatic spinal region should serve as the default advanced imaging study and may be considered medically necessary in this setting. MRI without and with contrast may instead be considered medically necessary when fever, suspected infection, a mass lesion, or new or worsening pain in an individual with an established cancer diagnosis is present (Ramirez et al., 2015; Saleh et al., 2021). CT without contrast may be considered medically necessary for reevaluation of a known vertebral bony disorder, evaluation of spondylotic changes or an isolated bony abnormality without canal or cord concern, or when a recent MRI does not provide sufficient bony detail for clinical decision-making (Kadom et al., 2018; McAlister et al., 2019). For a suspected spinal fracture with negative x-rays or an inconclusive MRI, including stress-fracture-specific code combinations, bone scan may be considered medically necessary because SPECT and bone scan have demonstrated sensitivity for detecting occult bony injury in pediatric populations (Matesan et al., 2016; Tofte et al., 2017; Trout et al., 2015).

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Spondylolysis (PEDSP-2.4)

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Criteria

Most cases of childhood spondylolysis are believed to be caused by repeated microtrauma, resulting in stress fracture of the pars interarticularis. Heredity is also believed to be a factor in some cases. It is the most common cause of low back pain in children older than age 10.

- Activity modification, NSAID treatment, physical therapy, and/or immobilization with various braces are the initial treatments for symptomatic individuals.
- Surgical treatment is only recommended for individuals with disabling symptoms that have not responded to non-surgical care.
- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- Spondylolysis is screened with plain x-rays.
  - MRI without contrast of the symptomatic spinal level is considered medically necessary to evaluate for stress reaction in bone and visualizing nerve roots if symptoms have continued despite a provider-directed 4-week course of conservative care after the current set of symptoms or physical exam findings started or changed, or if there is a documented need for preoperative planning.
  - If additional imaging is needed because of radiological uncertainty or associated spondylolisthesis, SPECT Radiopharmaceutical Localization Imaging (CPT® 78803) or SPECT/CT (CPT® 78830) is medically necessary to identify stress reaction in spondylolysis cases which are radiographically occult. Bone scan has been demonstrated to be superior to MRI in detecting active spondylolysis.
  - SPECT bone scans are especially sensitive for detecting spondylolysis, revealing areas of bone turnover; and the findings are generally positive for a prolonged period. CT without contrast of the symptomatic spinal level is medically necessary to provide detailed evaluation of bony anatomy, if there is a documented need for preoperative planning. CT scans have been considered the criterion standard for characterizing fractures and for detailing bone morphology and anatomy.

Evidence Discussion

A detailed history and physical examination, including neurologic examination and documentation of radicular features, along with plain radiography should be performed prior to advanced imaging in spondylolysis, given that it is the most common cause

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of low back pain in children older than age 10 (MacDonald et al., 2017; Calloni et al., 2017). MRI without contrast of the symptomatic spinal level may be considered medically necessary to evaluate for bony stress reaction and nerve root involvement when symptoms persist despite a four-week trial of conservative care, or when preoperative planning is required (Ramirez et al., 2015; Eckel et al., 2022). SPECT or SPECT/CT may be considered medically necessary to identify stress reaction in radiographically occult spondylolysis or when additional clarification is needed due to associated spondylolisthesis, as bone scan has demonstrated superior sensitivity to MRI for detecting active spondylolysis, identifying bone turnover at the pars interarticularis that remains positive for a prolonged period (Tofte et al., 2017; Trout et al., 2015; Ledonio et al., 2017; Kim et al., 2018). CT without contrast of the symptomatic spinal level may be considered medically necessary for detailed evaluation of bony anatomy when preoperative planning is required, given its established role as the standard for characterizing fracture morphology and bony detail (Kadom et al., 2018; McAlister et al., 2019).

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Spine Pain Due to Infectious Causes (PEDSP-2.5)

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Criteria

- Entities including, but not limited to, discitis and vertebral osteomyelitis, typically present with sudden onset of back pain, fever, and elevated white blood cell count, occurring most commonly in the first decade of life.
- A detailed history and physical examination with thorough neurologic examination should be performed initially.

Initial Imaging Studies

- Plain x-rays should be performed initially.
  - The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study.
- MRI without and with contrast of the symptomatic spinal level is very sensitive at detecting early changes and is considered medically necessary when discitis or osteomyelitis is clinically suspected.
- Nuclear medicine imaging also can be positive as soon as 1 to 2 days after the onset of symptoms. Any of the following studies are considered medically necessary for initial evaluation of suspected osteomyelitis:
  - Bone scan (one of CPT® codes: CPT® 78300, 78305, 78306, or 78315)
  - Nuclear Bone Marrow imaging (one of CPT® codes: CPT® 78102, 78103, or 78104)
  - Radiopharmaceutical inflammatory imaging (one of CPT® codes: CPT® 78800, 78801, 78802, 78803, or 78804)
  - SPECT (CPT® 78831)
  - SPECT/CT (CPT® 78830, or CPT® 78832)

Follow-Up Imaging Studies

- Follow-up plain x-rays may show disc space narrowing and bony changes of osteomyelitis.
- MRI without and with contrast of the symptomatic spinal level or CT with contrast (including myelography) is considered medically necessary for follow-up evaluating bony changes of osteomyelitis or concern for epidural abscess.
- Any of the following studies are considered medically necessary for evaluation of response to treatment in established osteomyelitis:

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- Bone scan (one of CPT® codes: CPT® 78300, 78305, 78306, or 78315)
- Nuclear Bone Marrow imaging (one of CPT® codes: CPT® 78102, 78103, or 78104)
- Radiopharmaceutical localization imaging (one of CPT® codes: CPT® 78800, 78801, 78803, 78830, 78831, or 78832)

Evidence Discussion

A detailed history and physical examination with neurologic assessment should be performed in suspected spine infection, as discitis and vertebral osteomyelitis typically present with sudden back pain, fever, and elevated white blood cell count in the first decade of life (Saleh et al., 2021). Plain x-rays may be considered medically necessary initially, though early films are frequently normal before disc space narrowing and bony changes become apparent (Saleh et al., 2021; Ortiz et al., 2021). MRI without and with contrast of the symptomatic spinal level may be considered medically necessary when discitis or osteomyelitis is clinically suspected, given its high sensitivity for detecting early infectious changes (Saleh et al., 2021; Ortiz et al., 2021). Bone scan, nuclear bone marrow imaging, radiopharmaceutical inflammatory imaging, SPECT, or SPECT/CT may be considered medically necessary for initial evaluation of suspected osteomyelitis, as nuclear medicine studies can become positive within one to two days of symptom onset (Ortiz et al., 2021; Seltzer et al., 2019). For follow-up, MRI without and with contrast or CT with contrast, including myelography, may be considered medically necessary to evaluate bony changes of osteomyelitis or concern for epidural abscess, and bone scan, nuclear bone marrow imaging, or radiopharmaceutical localization imaging may be considered medically necessary for evaluating treatment response in established osteomyelitis (Saleh et al., 2021; Ortiz et al., 2021; Seltzer et al., 2019).

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Spine Pain Related To Trauma and Painless Spine Trauma (PEDSP-2.6)

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Criteria

- Imaging evaluation of traumatic spine injury in children is generally directed based on clinical examination. 60% to 80% of all spinal injuries in children involve the cervical spine as opposed to the thoracic spine and lumbar spine. Common causes are motor vehicle accidents, falls, and sports-related injuries.
- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, should be performed prior to considering advanced imaging.
- When advanced imaging is appropriate, MRI without contrast or CT without contrast of the involved level is considered medically necessary as discussed in **Pediatric Spine Imaging Modality General Considerations (PEDSP-1.3)**
  - If the initial CT or MRI study is considered inconclusive, an exam of the other modality is considered medically necessary if needed to direct clinical management.

Cervical Spine

- The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study
- Advanced imaging of the cervical spine is considered medically necessary in children under 3 years of age when one or more of the following “red flags” are present:
  - Glasgow Coma Scale <14
  - Individual does not open eyes regardless of stimulus
  - Motor vehicle collision
- Advanced imaging of the cervical spine is considered medically necessary in children ≥3 years of age when one or more of the following “red flags” are present:
  - Altered mental status
  - Focal neurologic findings
  - Neck pain
  - Torticollis not present prior to trauma
  - Substantial torso injury
  - Diving or head-first injury
  - High speed motor vehicle collision

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- Predisposing conditions, e.g., Down syndrome
- Advanced imaging of the cervical spine is not considered medically necessary in children older than 2 years of age if they meet ALL of the following criteria:
  - Absence of posterior midline cervical pain
  - Absence of focal neurologic deficit
  - Normal level of alertness
  - No evidence of intoxication
  - Absence of other clinically apparent pain which could distract patient from the pain of a cervical injury

Thoracolumbar Spine

- Advanced imaging of the thoracolumbar spine is considered medically necessary in children following a recent x-ray when x-rays are inconclusive, or there is an abnormal neurological examination.

Suspected Physical Child Abuse

- In children with suspected physical child abuse and documented findings suggesting abuse (e.g., fractures on skeletal survey or other clinical indicators), MRI Cervical (CPT® 72141), Thoracic (CPT® 72146), and Lumbar (CPT® 72148) Spine without contrast are considered medically necessary to search for associated abnormalities.
  - If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast is considered medically necessary. See: **Pediatric Spine Imaging Modality General Considerations (PEDSP-1.3)**

Evidence Discussion

Pediatric traumatic spine imaging should be guided by clinical examination because injury patterns differ from those in adults and most pediatric spinal injuries involve the cervical spine. MRI without contrast or CT without contrast of the involved level may be considered medically necessary when pediatric trauma red flags are present, including Glasgow Coma Scale <14, absent eye opening, motor vehicle collision in children younger than 3 years of age, or altered mental status, focal neurologic findings, neck pain, traumatic torticollis, substantial torso injury, diving or head-first injury, high-speed motor vehicle collision, or predisposing conditions in children age 3 years and older. In children older than 2 years, MRI or CT may not be considered medically necessary when all low-risk criteria are met, including no posterior midline cervical pain, no focal neurologic deficit, normal alertness, no intoxication, and no distracting pain. MRI without contrast or CT without contrast of the thoracolumbar spine may be considered medically necessary after recent x-ray when the x-rays are inconclusive or the neurologic examination is abnormal. In suspected physical child abuse with documented findings suggesting abuse, MRI of the cervical, thoracic, and

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lumbar spine without contrast may be considered medically necessary to evaluate for associated spinal abnormalities. MRI without and with contrast may be considered medically necessary when IV access is already present for anesthesia and contrast is not contraindicated (Born et al., 2020; Kadom et al., 2019; McAlister et al., 2019; Wooten-Gorges et al., 2017).

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Kyphosis and Scoliosis (PEDSP-3)

Guideline

Juvenile Thoracic Kyphosis (Scheuermann Disease) (PEDSP-3.1)
Scoliosis (PEDSP-3.2)
References (PEDSP-3)

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Juvenile Thoracic Kyphosis (Scheuermann Disease) (PEDSP-3.1)

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Criteria

- This condition is also known as Scheuermann Kyphosis, and these individuals generally present with chronic and recurrent back pain.
- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- X-rays will typically show anterior wedging in three or more adjacent vertebral bodies.
  - Lower thoracic kyphosis from developmental vertebral wedging with thoracic kyphosis varying between 20° and 45° should be identified by plain x-rays before considering advanced imaging.
  - MRI is not an effective diagnostic modality and is therefore not considered medically necessary for this condition since the incidence of false positive vertebral changes in normal individuals is high.
- MRI Thoracic Spine without contrast (CPT® 72146) is considered medically necessary preoperatively to rule out any associated spinal cord problems.
- MRI Lumbar Spine without contrast (CPT® 72148) is considered medically necessary preoperatively to rule out any associated spinal cord conditions when there is clinical or radiographic evidence of lumbar abnormalities.

Evidence Discussion

A detailed history and physical examination, including neurologic examination and documentation of radicular features, should be performed prior to advanced imaging (Calloni et al., 2017; Mistovich & Spiegel, 2020). Plain x-rays are considered medically necessary as the initial imaging study, typically demonstrating anterior wedging across three or more adjacent vertebral bodies (Gokce & Beyhan, 2016; Shafa & Shah, 2019). MRI is not considered medically necessary for diagnosis given a high rate of false-positive vertebral changes in normal individuals, though MRI of the thoracic or lumbar spine without contrast is medically necessary preoperatively to rule out associated spinal cord abnormality (Shafa & Shah, 2019; Oetgen, 2018).

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Scoliosis (PEDSP-3.2)

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Criteria

- Scoliosis is an abnormal lateral curve of the thoracic or thoraco-lumbar spine in the frontal plane. A small lateral curve in a skeletally mature person is not uncommon and generally does not require further investigation.
- Using the Cobb technique for measuring these curves, a curve of under 10˚ is normal, a curve from 10˚ to 20˚ is mildly abnormal, a curve over 20˚ is significantly abnormal, and a curve over 40˚ is severely abnormal.
- Most individual with significant scoliosis have some element of kyphosis as well.
  - There are many ways of classifying scoliosis. These guidelines will classify scoliosis as congenital, idiopathic, and neuromuscular scoliosis.
- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, detailed examination of the spine in different body positions, and plain radiography should be performed prior to considering advanced imaging.
  - Standing posteroanterior (PA) and lateral x-rays of the spine are the initial imaging studies and are used for follow-up. If anteroposterior (AP) x-rays are to be performed, breast shields should be used to reduce breast radiation exposure.
  - Spine surgical specialists sometimes appropriately request both MRI and CT together for preoperative planning of scoliosis surgery.
    - In addition, MR and CT are useful to identify an underlying cause of scoliosis, such as congenital and developmental anomalies.
    - MR or CT Spine is considered medically necessary postoperatively when recent postoperative x-rays are inconclusive for managing individual treatment.
      - Individuals with severe scoliosis may have compromised lung development. CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) is medically necessary in the perioperative period as well as 2 and 5 years postoperatively to assess lung growth.

Congenital Scoliosis

Cases are recognized in infancy or early childhood. Most cases arise from anomalies of vertebral development, and many are associated with anomalies of the genitourinary system or of other organs.

- In infants under 6 months of age spinal ultrasound (CPT® 76800) is considered medically necessary after initial imaging with plain x-rays.

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- MRI Cervical (CPT® 72141), Thoracic (CPT® 72146), and Lumbar (CPT® 72148) Spine without contrast are considered medically necessary to search for underlying anomalies.
  - If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may, is considered medically necessary. See: **Pediatric Spine Imaging Modality General Considerations (PEDSP-1.3)**
- MRI Brain without and with contrast is considered medically necessary if the clinical evaluation or preliminary imaging studies suggest an associated intracranial anomaly.
- Renal ultrasound (CPT® 76770 or CPT® 76775) is considered medically necessary since nearly one-third of individuals also have genitourinary anomalies.
  - CT, MRI, or nuclear medicine studies of the genitourinary tract are considered medically necessary if the ultrasound is abnormal.

Idiopathic Scoliosis

Idiopathic scoliosis is the most common form of pediatric scoliosis and is divided into infantile (0-3 years of age), juvenile (4-9 years of age), and adolescent (10-17 years of age). Idiopathic scoliosis is defined as having no underlying structural abnormality or accompanying syndrome.

- The following clinical features are associated with an increased risk of underlying vertebral or spinal cord abnormality:
  - Associated back pain
  - Age younger than 10 years
  - Neurological abnormalities on examination or neurological symptoms
  - Left sided curve (concave to right)
  - Absence of apical segment lordosis/kyphosis
  - Rapid curve progression (>1 degree per month)
  - Pes Cavus (see: **Occult Spinal Dysraphism (PEDSP-4.3)**
  - Double curves or high thoracic curves
  - Kyphosis
  - Spinal x-ray abnormalities other than the curve itself (widened spinal canal, dysplastic changes in spine or ribs, etc.)
  - Midline spinal cutaneous markers (esp. sacral) such as dermal tracts, tufts of hair, skin tags, etc.
  - Abnormal number or size of café au lait spots (neurofibromatosis)
- MRI Cervical (CPT® 72141), Thoracic (CPT® 72146), and Lumbar (CPT® 72148) Spine without contrast are considered medically necessary for the evaluation of scoliosis when any of the above clinical features is present or if imaging is requested for individuals who are being actively evaluated for corrective surgery.

Neuromuscular Scoliosis

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Scoliosis can result from many disorders of the nervous system. In some conditions, including (but not limited to) cerebral palsy, muscular dystrophy, and spinal muscular atrophy, associated scoliosis may develop over time.

The appropriate spinal level, modality, and contrast level of advanced imaging will depend on the nature of the underlying disease.

- MRI without contrast or without and with contrast or CT without contrast of the cervical, thoracic, and/or lumbar spine is considered medically necessary in these individuals with painful neuromuscular scoliosis, or when they are actively being evaluated for spinal deformity corrective surgery.
- Bone scans (one of CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, or CPT® 78315) are considered medically necessary to evaluate cases of painful scoliosis and to identify tumors or infections. They are more sensitive than plain radiography.
  - Post-surgical considerations are similar to adult post-operative indications (see: **Post-Operative Spinal Disorders (SP-15)** in the General Spine Imaging Guidelines) except as follows:
    - Post-operative CT Chest without contrast (CPT® 71250) with 3D reconstruction is considered medically necessary for lung volume measurement in children with early onset scoliosis, (e.g., congenital/thoracogenic type), due to risk of restrictive lung disease and thoracic insufficiency syndrome which occur from failure of spine and chest to support normal lung growth.

Evidence Discussion

A detailed history and physical examination, including neurologic examination and documentation of radicular features, should be performed prior to advanced imaging (Calloni et al., 2017; Mistovich & Spiegel, 2020). Standing PA and lateral x-rays may be considered medically necessary as the initial and follow-up imaging studies (American College of Radiology, 2014; Ng & Bettany-Saltikov, 2017). MRI or CT may be considered medically necessary to identify an underlying structural cause of scoliosis, particularly congenital or developmental anomalies, and postoperatively when recent x-rays are inconclusive for guiding treatment (Jones et al., 2018; El-Hawary & Chukwunyerenwa, 2014; Alsharief et al., 2018). In congenital scoliosis, MRI of the spine may be considered medically necessary to evaluate for underlying anomalies given the associated risk of genitourinary and intracranial malformation, supporting concurrent renal ultrasound and brain MRI when clinically indicated (Mistovich & Spiegel, 2020). In idiopathic scoliosis, MRI may be considered medically necessary when specific clinical or radiographic features raise suspicion for an underlying vertebral or spinal cord abnormality, as these features correlate with higher diagnostic yield (Calloni et al., 2017; Jones et al., 2018). In neuromuscular scoliosis, MRI or CT may be considered medically necessary for painful curves or preoperative evaluation, while bone scan may be considered medically

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necessary to evaluate suspected tumor or infection given its greater sensitivity relative to plain radiography (El-Hawary & Chukwunyerenwa, 2014).

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References (PEDSP-3)

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Spinal Dysraphism and Tethered Spinal Cord (PEDSP-4)

Guideline

Introduction (PEDSP-4.1)
Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.2)
Non-Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.3)
Spinal Dysraphism (PEDSP-4.4)
References (PEDSP-4)

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Introduction (PEDSP-4.1)

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Criteria

Spinal Dysraphism

- Spinal dysraphism refers to a group of disorders characterized by incomplete or absent fusion of posterior midline structures. This includes a range of congenital and/or developmental anomalies of the spinal cord and associated spinal structures that can affect any level of the spine, but most commonly the lumbosacral region.
- Based on clinical classification, dysraphism is grouped into two categories:
  - Open dysraphism (spina bifida aperta), which are non-skin-covered, open neural tube defects (myelomeningocele).
  - Occult spinal dysraphism (also called closed spinal dysraphism), which includes skin-covered defects (either with or without an associated subcutaneous mass).

Normal position of spinal cord

- In newborns, the spinal cord should terminate (at the conus medullaris) at L2-3 or higher.
- By 3 months of age, the conus should lie at or above the L2 level.
- Afterwards, in normal infants and children, the conus medullaris should be positioned at L1-2.
- Of note, however, in premature infants, the conus medullaris may be located at the mid L3-level.
  - If such a finding on an initial spinal ultrasound results in uncertainty as to whether cord termination is low, repeat spinal ultrasound (CPT® 76800) is considered medically necessary in 4 to 6 weeks, since a normal cord will have “moved” higher within the spinal canal by this time.

Tethered cord

- Tethering is certain when the cord terminates at or below L4 and there is other supporting evidence of tethering such as limited spinal cord pulsatility, posterior positioning in the spinal canal, thick filum terminale, intraspinous mass, or lipoma.
- If the conus terminates at a normal position (at L2-3 under 3 months of age, at L2 by 3 months of age, at L1-2 in older infants and children), the cord may still be tethered by an abnormal structure. Such tethering of the spinal cord can be found in some (but not all) individuals with occult spinal dysraphism. Abnormalities can be found in both lumbosacral and thoracic regions and are often associated with spinal lipomas in either region.

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- Open spinal dysraphism is frequently associated with tethering of the spinal cord; symptoms of or findings from that tethering may manifest initially or may increase after the newborn period and the initial imaging evaluation. See: **Open Dysraphism (PEDSP-4.4)**.

"Tethered cord Syndrome"

- "Tethered Cord Syndrome" refers to symptoms and abnormal physical findings (such as low back or leg pain, decreased or absent lower extremity reflexes, urinary urgency, urinary incontinence, bowel incontinence, and constipation) that arise when a pathologic attachment causes abnormal spinal tension (increased by axial growth), with ensuing pathophysiologic effects. Some of these patients do have an abnormally low conus medullaris; other patients have other spinal abnormalities (such as spinal dysraphism) that causes the spinal cord to be abnormally tethered. Other patients with spinal dysraphism who may present with symptoms or findings suggestive of "Tethered Cord Syndrome" may have those clinical manifestations caused by primary dysplasia of neural tissue, instead of being caused by abnormal tethering. See: **Non-Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.3)**.
- Not all anatomically tethered spinal cords result in symptoms of "Tethered Cord Syndrome."

Imaging Studies to Evaluate Suspected Occult Spinal Dysraphism and/or Tethered Cord

- Plain x-rays are not indicated for suspected occult spinal dysraphism and/or tethered cord.
- Spina bifida occulta, an incomplete fusion of the posterior lumbosacral bony elements (present in in about 25% of people), is often discovered as an incidental finding on x-rays and other imaging exams. In asymptomatic individuals it is of no consequence, and is not an indication for further imaging.
- A plain spine x-ray finding suggesting an absent or distorted pedicle (the "winking owl sign") can be indicative of occult spinal dysraphism, for which an initial MRI without contrast or MRI without and with contrast of the appropriate spinal level is considered medically necessary.
- When indicated (See: **Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.2)**, **Non-Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.3)**, and **Open Dysraphism (PEDSP-4.4)** for indications), the following imaging is considered medically necessary:
  - Spinal ultrasound (CPT® 76800) for initial evaluation in infants up to 6 months of age, in premature infants whose "corrected age" (subtracting the number of weeks of prematurity from the infant's actual age) is less than or equal to 6 months, or in older individuals with open spinal dysraphism (see: **Open Dysraphism (PEDSP-4.4)**).

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- In a term infant, the diagnosis of tethered cord is likely if the conus terminates below the L2-L3 disc space. Of note, however, in premature infants, the conus medullaris may be located at the mid L3-level; if there is uncertainty as to whether cord termination is low in a premature infant, repeat spinal ultrasound (CPT® 76800) is considered medically necessary in 4 to 6 weeks, since a normal cord will have "moved" higher within the spinal canal by this time.
- MRI Cervical, Thoracic, and Lumbar spine without contrast (CPT® 72141, 72146, and 72148) or without and with contrast (CPT® 72156, 72157, and 72158) is considered medically necessary for initial evaluation in individuals older than 6 months of age.
  - MRI is considered medically necessary at a younger age when there are symptoms or physical findings or concerning findings on ultrasound showing the need for more prompt MRI imaging, or when MRI imaging prior to 6 months of age has been ordered by (or in consultation with) an appropriate specialist for an indication from **Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.2)**, **Non-Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.3)**, or **Open Dysraphism (PEDSP-4.4)**.
- The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually ordered by (or after consultation with) an appropriate specialist.
- Postoperative MRI is not done routinely but is considered medically necessary if there are recurrent symptoms or findings suggesting recurrent tethering or other deterioration. Contrast level per ordering specialist.
- A complete abdominal ultrasound (CPT® 76700) or retroperitoneal ultrasound (CPT® 76770) is considered medically necessary as an initial evaluation for patients with newly diagnosed neurogenic bladder, myelomeningocele (open spinal dysraphism), or occult spinal dysraphism.
  - A complete retroperitoneal ultrasound (CPT® 76770) is considered medically necessary every 6 to 12 months for follow-up/surveillance for any of the above conditions.
- CT of the effected spinal level is considered medically necessary for surgical planning when a complex bony deformity of the spine is present, or when the Guidelines support doing MRI of the spine in an individual for whom MRI is contraindicated.

Evidence Discussion

Spinal dysraphism encompasses a spectrum of congenital anomalies of incomplete posterior midline fusion, classified clinically as open (spina bifida aperta) or occult (closed) dysraphism, with the spinal cord normally terminating at L2-3 or higher in newborns, at or above L2 by 3 months, and at L1-2 in older infants and children (Trapp, 2021; Kumar, 2017; Kinsman & Johnston, 2020). Tethering is established when the

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conus terminates at or below L4 with corroborating features such as limited cord pulsatility, posterior positioning, a thick filum terminale, or an associated lipoma, and Tethered Cord Syndrome describes the symptomatic manifestations (low back or leg pain, diminished lower extremity reflexes, and urinary and bowel dysfunction) that arise when pathologic attachment produces abnormal spinal tension, recognizing that not all anatomically tethered cords are symptomatic (Hertzler, 2010; Tuite, 2018; Proctor, 2020). Because the incompletely ossified posterior elements of the infant spine provide an acoustic window, spinal ultrasound is considered medically necessary as the first-line study for infants up to 6 months of age or premature infants with a corrected age at or below 6 months, with repeat ultrasound considered medically necessary in 4 to 6 weeks when cord termination is borderline low, since a normal cord will have ascended within the canal by that time (AIUM, 2016; Orman, 2019; Inarejos Clemente, 2023; Siegel, 2018). MRI of the appropriate spinal level without contrast or without and with contrast is considered medically necessary for initial evaluation after 6 months of age, or earlier when symptoms, physical findings, concerning ultrasound findings, or specialist direction warrant more prompt imaging, while postoperative MRI is considered medically necessary only for recurrent symptoms or findings suggesting recurrent tethering (O'Neill, 2017; Kumar, 2017; Halevi, 2011). Complete abdominal or retroperitoneal ultrasound is considered medically necessary as the initial genitourinary evaluation for newly diagnosed neurogenic bladder or dysraphism with retroperitoneal ultrasound surveillance considered medically necessary every 6 to 12 months, and CT of the affected level is considered medically necessary for surgical planning when a complex bony deformity is present or when MRI is indicated but contraindicated (Tuite, 2018; Tamura, 2017).

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Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.2)

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Criteria

- More than 80% of individuals with occult spinal dysraphism and/or tethered spinal cord will have a cutaneous lesion overlying the lower spine.
- Spine imaging is considered not medically necessary in the following situations:
  - Pilonidal cysts below the level of the intergluteal fold.
    - For discussion of imaging in pilonidal cysts, see: **Pilonidal Cyst (PV-21.4)** in the Pelvis Imaging Guidelines
  - Non-specific darkened areas of skin over the sacrum (such as dermal melanosis) unless there are other associated midline cutaneous abnormalities
  - Occult bony dysraphism incidentally noted on x-ray
- Screening with advanced imaging is considered medically necessary in the following clinical conditions which are associated with an increased risk of underlying spinal dysraphism:
  - Spinal dimples (midline soft tissue depression over the spine); or deviated or split (bifid) gluteal cleft
    - Spinal ultrasound (CPT® 76800) is considered medically necessary for initial evaluation in infants up to 6 months of age (or in premature infants with a "corrected" age up to 6 months of age). Follow-up of a normal screening spinal ultrasound with ultrasound is considered not medically necessary.
    - MRI of the involved spinal level without contrast or without and with contrast is considered medically necessary for initial evaluation in individuals older than 6 months of age. MRI is considered medically necessary at a younger age when there are symptoms or physical findings or concerning findings on ultrasound showing the need for more prompt MRI imaging, or if ordered by (or in consultation with) an appropriate specialist.
    - A screening MRI is medically necessary after a normal screening spinal ultrasound exam. Follow-up of a normal screening MRI imaging study is considered not medically necessary.
  - Dermal sinuses overlying the lumbar, thoracic, or cervical spine, and sacral dermal sinuses, whether manifested by a dermal sinus tract (a small opening in the skin, which leads into a narrow duct; it may be associated with protruding hairs) or a dermal cyst. They may be associated with an overlying or nearby hairy patch or vascular nevus

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- Spinal ultrasound (CPT® 76800) is considered medically necessary for initial evaluation in infants up to 6 months of age (or in premature infants with a "corrected" age up to 6 months of age). Follow-up of a normal screening spinal ultrasound is considered not medically necessary.
- MRI of the involved spinal level without contrast or without and with contrast is considered medically necessary if an ultrasound shows abnormalities other than a cutaneous dermal cleft, if ordered after 6 months of age, or at a younger age if ordered by (or in consultation with) an appropriate specialist.
- A screening MRI is considered medically necessary after a normal screening spinal ultrasound exam. Follow-up of a normal screening MRI imaging study is considered not medically necessary.

◦ Subcutaneous midline masses (including cysts and lipomas) at any level.
- Plain x-rays are not required to approve other imaging for midline masses overlying the spine when occult spinal dysraphism and/or tethered cord is suspected.
- Spinal ultrasound (CPT® 76800) is considered medically necessary for initial evaluation in infants up to 6 months of age (or in premature infants with a "corrected" age up to 6 months of age), but MRI of the involved spinal level without contrast or without and with contrast is the preferred considered medically necessary initial imaging for midline masses overlying the spine. Repeat ultrasound follow-up of a normal screening spinal ultrasound is considered not medically necessary.
- MRI of the involved spinal level without contrast or without and with contrast is considered medically necessary for initial evaluation in patients older than 6 months of age. MRI is considered medically necessary at a younger age when there are symptoms or physical findings or concerning findings on ultrasound showing the need for more prompt MRI imaging, or if ordered by (or in consultation with) an appropriate specialist.
- A screening MRI is considered medically necessary after a normal screening spinal ultrasound exam. Follow-up of a normal screening MRI imaging study is considered not medically necessary.

◦ Caudal extensions (including tail-like appendages), midline skin tags, abnormal patches of hair over the spine at any level, infantile hemangiomas overlying any spinal level, and complex midline birthmarks above the upper sacral region.
- Spinal ultrasound (CPT® 76800) is considered medically necessary for initial evaluation in infants up to 6 months of age (or in premature infants with a "corrected" age up to 6 months of age). Repeat ultrasound follow-up of a normal screening spinal ultrasound is considered not medically necessary.
- MRI of the involved spinal level without contrast or without and with contrast is considered medically necessary for initial evaluation in individuals older than 6 months of age. MRI is considered medically necessary at a younger

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age when there are symptoms or physical findings or concerning findings on ultrasound showing the need for more prompt MRI imaging, or if ordered by (or in consultation with) an appropriate specialist.
    - A screening MRI is considered medically necessary after a normal screening spinal ultrasound exam. Follow-up of a normal screening MRI imaging study is considered not medically necessary.
- Café au lait spots are a marker for type 1 neurofibromatosis
    - See imaging indications in **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** and/or **Neurofibromatosis (PEDPN-2)**.

Evidence Discussion

Screening imaging is considered medically necessary for cutaneous stigmata associated with an increased risk of occult spinal dysraphism, including spinal dimples, dermal sinus tracts, subcutaneous midline masses, and hairy patches, given their established correlation with underlying cord anomalies (Kucera et al., 2015; Gomi et al., 2013; Harada et al., 2014). Ultrasound is considered medically necessary as the initial screening study in infants up to 6 months of age, with MRI medically necessary for initial evaluation beyond that age or when ultrasound is abnormal or inconclusive (Tamura et al., 2017; Trapp et al., 2021). MRI is considered medically necessary for midline masses overlying the spine, including lipomas and hemangiomas, given documented risk of associated intraspinal extension (Subiabre-Ferrer et al., 2019).

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Non-Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.3)

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Criteria

- Imperforate anus
- VACTERL (vertebral malformations, anal atresia, cardiac anomalies, tracheo-esophageal fistula, renal abnormalities, and limb defects) syndrome
- Currarino triad (sacral dysgenesis, presacral mass, anorectal malformation), OEIS (omphalocele, exstrophy, imperforate anus, spinal defects) syndrome
- Caudal regression syndrome
- Sacral agenesis (when 2 or more of the sacral vertebral bodies are absent; about 20% of children with sacral agenesis are not detected prior to age of 3 years).
- For all of the above conditions, the following imaging is considered medically necessary:
  - Spinal ultrasound (CPT® 76800) for initial evaluation in infants up to 6 months of age (or in premature infants with a “corrected” age up to 6 months of age). Repeat ultrasound follow-up of a normal screening spinal ultrasound is considered not medically necessary.
  - MRI Lumbar Spine without contrast (CPT® 72148) or without and with contrast (CPT® 72158); and/or MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197).
  - Appropriate MRI (or other modality) imaging (including contrast level) of any other spinal level will depend on the nature of the underlying disease, usually ordered by (or in consultation with) an appropriate specialist.
  - Follow-up of a normal screening MRI imaging study is not medically necessary, but an initial MRI can be approved if the first screening study was an ultrasound.
  - Postoperative MRI is not done routinely but is medically necessary if there are recurrent symptoms or findings suggesting recurrent tethering. Contrast level per ordering specialist.
- For Rubinstein-Taybi syndrome (gait abnormalities, short stature, short limbs, characteristic facies, developmental delay, tethered spinal cord), the following imaging is considered medically necessary:
  - Spinal ultrasound (CPT® 76800) for initial evaluation in infants up to 6 months of age (or in premature infants with a “corrected” age up to 6 months of age). Repeat ultrasound follow-up of a normal screening spinal ultrasound is considered not medically necessary.

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- MRI Lumbar spine without contrast (CPT® 72148) or without and with contrast (CPT® 72158)
- Appropriate MRI (or other modality) imaging (including contrast level) of any other spinal level will depend on the nature of the underlying disease, usually ordered by (or in consultation with) an appropriate specialist.
- Follow-up of a normal screening MRI imaging study is considered not medically necessary, but an initial MRI can be approved if the first screening study was an ultrasound.

- For individuals with known DiGeorge Syndrome (22q11.2 deletion syndrome), the following imaging is considered medically necessary when tethered cord syndrome or occult spinal dysraphism is suspected:
  - Spinal ultrasound (CPT® 76800) for initial evaluation in infants up to 6 months of age
  - MRI Lumbar Spine without contrast (CPT® 72148) or without and with contrast (CPT® 72158)
  - Appropriate MRI (or other modality) imaging (including contrast level) of any other spinal level will depend on the nature of the underlying disease, usually ordered by (or in consultation with) an appropriate specialist.
  - Follow-up of a normal screening MRI imaging study is considered not medically necessary, but an initial MRI can be approved if the first screening study was an ultrasound.
- MRI of the involved spinal level without contrast or without and with contrast is considered medically necessary for neurologic related symptoms and physical exam findings suggestive of occult spinal dysraphism, tethered cord syndrome, and/or low lying conus medullaris when any of the following are present:
  - Asymmetry of the feet, with one smaller foot, a high arch, and/or clawing of the toes. This is sometimes called the “neuroorthopedic syndrome”, and is associated with lack of an ipsilateral ankle jerk deep tendon reflex and calf atrophy.
  - Cavus foot (also called pes cavus or pes cavovarus)
  - Toe walking, when associated with upper motor neuron signs including hyperreflexia, spasticity, and positive Babinski sign
  - Ataxia (see: **Ataxia (PEDHD-20)**)
  - Absent perineal sensation
  - Lower urinary tract dysfunction, including urinary urgency or urinary incontinence. Though not a requirement for advanced imaging, some of these patients will have had abnormal urodynamic studies (such as cystometrography and/or sphincter electromyography).
  - Constipation, especially if there are abnormal physical exam findings related to the spine (such as lower extremity weakness, decreased lower extremity tone, abnormal lower extremity reflexes, a tuft of hair over the spine or covering a pilonidal dimple, a sacral dimple, gluteal cleft deviation, or absent anal or

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cremasteric reflex), failure of maximal laxative therapy (see: **Constipation, Diarrhea, and Irritable Bowel Syndrome (PEDAB-12)**) and/or bowel incontinence, when tethered cord syndrome or occult spinal dysraphism is suspected as the cause
    - Back or leg pain when tethered cord syndrome or occult spinal dysraphism is suspected as the cause. In this setting, neither a plain x-ray of the spine nor a recent period of provider directed conservative treatment is required to approve an MRI spine).
- See: **Myelopathy (SP-7.1)**, **Myelopathy (PEDSP-6)**, and **Developmental Motor Delay (PEDHD-19.3)** for spinal cord involvement suspected in individuals with developmental motor delay.

Evidence Discussion

Imaging may be considered medically necessary in syndromic and structural conditions associated with occult spinal dysraphism, including VACTERL association, Currarino triad, caudal regression syndrome, and sacral agenesis, given their recognized co-occurrence with tethered cord (Kumar et al., 2017; Moore, 2019; Hervey-Jumper et al., 2011). MRI may be considered medically necessary for neurologic signs and symptoms suggestive of tethered cord syndrome, including asymmetric foot deformity, toe walking with upper motor neuron signs, and lower urinary tract or bowel dysfunction, consistent with the clinical criteria established for evaluating suspected tethering (Tuite et al., 2018; Haynes et al., 2018; Proctor, 2020).

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Spinal Dysraphism (PEDSP-4.4)

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Criteria

- Clinically significant dysraphism includes findings ranging from complex vertebral anomalies to myelomeningocele.
- Dysraphism is categorized into 2 major groups:
  - Open Dysraphism - lack of skin covering with exposed neural elements
  - Closed Dysraphism - skin covered
- It is rare to perform MRI in neonates with open dysraphism as the diagnosis is usually made with obstetric ultrasound and confirmed with visual inspection
  - MRI of the entire spine is considered medically necessary for preoperative planning if ordered by a specialist.
- MRI Brain without contrast (CPT® 70551) or with and without contrast (CPT® 70553) is considered medically necessary in all cases of open dysraphism as Chiari II malformation will be present
- Closed Dysraphism
  - MRI of the entire spine without contrast or without and with contrast is considered medically necessary at the time of initial diagnosis.
    - MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) or CT without contrast of the brain (CPT® 70450) is considered medically necessary in cases with associated hydrocephalus, signs of cerebral involvement, or the presence of multiple hydromyelia (which suggests hydrocephalus).
    - MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72196) is considered medically necessary once if there are clinical signs of pelvic malformation or anorectal anomaly.
  - MRI Cervical, Thoracic, and Lumbar spine without contrast (CPT® 72141, 72146, 72148) or without and with contrast (CPT® 72156, 72157, 72158) is considered medically necessary when ordered for preoperative planning.
  - Spinal canal ultrasound (CPT® 76800) is considered medically necessary as an alternative to MRI, if requested, in individuals with open dysraphism as the posterior bony defect provides an acoustic window for ultrasound.
  - MRI of the appropriate spinal level without contrast or without and with contrast is considered medically necessary when there are new and/or worsened neurologic symptoms and/or physical exam findings suggestive of new or worsened tethering of the spinal cord, such as any of the following:
    - New or worsened cavus foot

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- New or worsened toe walking and/or upper motor neuron signs (including hyperreflexia, spasticity, and positive Babinski sign)
- New or worsened leg weakness or numbness or difficulty in ambulation
- New or worsened loss of perineal sensation
- New or worsened lower urinary tract dysfunction (including urinary urgency or urinary incontinence, or new or worse changes on diagnostic urodynamic studies)
- New or worsened constipation
- New or worsened pain in the back or legs suspected to have been caused by tethering of the spinal cord
  - MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) or CT without contrast of the brain (CPT® 70450) is considered medically necessary in cases with associated hydrocephalus, signs of cerebral involvement, or the presence of multiple hydromyelia (which suggests hydrocephalus).
  - MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72196) is considered medically necessary once if there are clinical signs of pelvic malformation or anorectal anomaly.

◦ The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually requested after specialist consultation.

Evidence Discussion

MRI of the entire spine may be considered medically necessary for preoperative planning in open dysraphism, and MRI of the brain may be considered medically necessary in all cases of open dysraphism given the near-universal association with Chiari II malformation (Kinsman & Johnston, 2020; Wang & Bierbrauer, 2017). In closed dysraphism, MRI of the entire spine may be considered medically necessary at initial diagnosis, with MRI or CT of the brain considered medically necessary when hydrocephalus or cerebral involvement is suspected, and MRI of the pelvis considered medically necessary when pelvic malformation or anorectal anomaly is present (Trapp et al., 2021; Greenan et al., 2019). Spinal canal ultrasound may be considered medically necessary as an alternative to MRI in open dysraphism, exploiting the acoustic window provided by the posterior bony defect (Orman et al., 2019; Inarejos Clemente et al., 2023). MRI may be considered medically necessary for new or worsening neurologic symptoms suggestive of progressive tethering, consistent with recommendations to reserve advanced imaging for clinical deterioration rather than routine surveillance (Tuite et al., 2018; Hertzler et al., 2010).

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Tethered Cord (PEDSP-5)

Guideline

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Tethered Cord (PEDSP-5)

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- See: **Spinal Dysraphism and Tethered Spinal Cord (PEDSP-4)**

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Myelopathy (PEDSP-6)

Guideline

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Myelopathy (PEDSP-6)

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Myelopathy imaging indications in pediatric individuals are similar to those for adult individuals. See: **Myelopathy (SP-7)** in the Spine Imaging Guidelines and/or **Non-Cutaneous Indications to Suspect Occult Spinal Dysraphism (PEDSP-4.3)**

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Other Congenital and Pediatric Spine Disorders (PEDSP-7)

Guideline

General Guidelines - Other Congenital and Pediatric Spine Disorders (PEDSP-7.0)
Achondroplasia (PEDSP-7.1)
Inflammatory Spondylitis (PEDSP-7.2)
Atlantoaxial Instability in Trisomy 21 (Down Syndrome) (PEDSP-7.3)
Basilar Impression (PEDSP-7.4)
Chiari Malformation (PEDSP-7.5)
Klippel-Feil Anomaly (Congenital Fusion of Cervical Vertebrae) (PEDSP-7.6)
Marfan Syndrome (PEDSP-7.7)
Neurofibromatosis (PEDSP-7.8)
Von Hippel-Lindau Syndrome (VHL) (PEDSP-7.9)
References (PEDSP-7)

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General Guidelines - Other Congenital and Pediatric Spine Disorders (PEDSP-7.0)

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- Many congenital spine disorders also affect adults as survival continues to improve for these individuals. Adults with disorders covered in this section may follow these guidelines except where contraindicated by specific statements in the general imaging guidelines.

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Achondroplasia (PEDSP-7.1)

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Criteria

- The diagnosis of achondroplasia is made clinically. Individuals with achondroplasia are at risk for hydrocephalus as well as myelopathy from spinal stenosis with increasing age.
- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- MRI without contrast or without and with of the symptomatic spinal region is considered medically necessary when new or worsening clinical symptoms suggest achondroplasia-related spinal stenosis.
- MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is considered medically necessary when new or worsening clinical symptoms suggest hydrocephalus.

Evidence Discussion

A detailed history and physical examination with neurologic assessment should be performed prior to advanced imaging, given the clinical diagnosis of achondroplasia and its associated risk of spinal stenosis and hydrocephalus with increasing age (Khalid & Saifuddin, 2021; Dweck & Lachman, 2019). MRI of the symptomatic spinal region without contrast or without and with contrast may be considered medically necessary when new or worsening symptoms suggest achondroplasia-related spinal stenosis, consistent with the progressive nature of foramen magnum and spinal canal narrowing described in this population (White et al., 2016; Sarioglu et al., 2020). MRI of the brain or CT of the head may be considered medically necessary when symptoms suggest hydrocephalus, reflecting the recognized coexistence of ventriculomegaly with cervicomedullary compression in achondroplasia (White et al., 2016).

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Inflammatory Spondylitis (PEDSP-7.2)

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Criteria

- Except as listed below, imaging considerations in pediatric and adult individuals are identical for this condition and these individuals should be imaged according to **Inflammatory Spondylitis (SP-10.2)**.

For pediatric individuals with juvenile idiopathic arthritis, the following imaging is considered medically necessary:

- MRI without and with contrast or without contrast of the involved levels
- An initial x-ray is not necessary prior to MRI in these individuals.
- For evaluation of facet arthropathy in patients with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis:
  - Whole body radiopharmaceutical localization imaging (CPT® 78802) and SPECT (CPT® 78803) OR
  - SPECT/CT (CPT® 78830)

Evidence Discussion

MRI without contrast or without and with contrast of the involved levels may be considered medically necessary in juvenile idiopathic arthritis without a preceding x-ray requirement, given the demonstrated superiority of MRI over radiography for detecting early sacroiliac and spinal inflammatory change in this population (Herregods et al., 2016; Restrepo et al., 2013; Sudoł-Szopińska et al., 2017). Whole-body radiopharmaceutical localization imaging with SPECT or SPECT/CT may be considered medically necessary for evaluation of facet arthropathy in ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis, consistent with established MRI classification criteria for active inflammatory disease that inform when nuclear imaging is appropriately reserved for facet-specific evaluation (Lambert et al., 2016).

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Atlantoaxial Instability in Trisomy 21 (Down Syndrome) (PEDSP-7.3)

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Criteria

- The diagnosis of atlantoaxial instability is a recognized complication of trisomy 21, and individuals are routinely screened with lateral x-rays of the cervical spine.
- MRI Cervical Spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) is considered medically necessary in individuals where the lateral cervical spine x-ray demonstrates an atlantodental (pre-dens) interval of ≥4.5 mm, and/or a neural canal width of ≤14 mm.
- MRI Cervical Spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) is considered medically necessary when new or worsening clinical symptoms suggest myelopathy in a trisomy 21 individual.

Evidence Discussion

Lateral cervical spine x-rays may be considered medically necessary as the initial screening study given the recognized risk of atlantoaxial instability in trisomy 21 (Machida et al., 2022). MRI of the cervical spine without contrast or without and with contrast may be considered medically necessary when x-ray demonstrates an atlantodental interval of 4.5 mm or greater or a neural canal width of 14 mm or less, or when new or worsening symptoms suggest myelopathy, consistent with radiographic-MRI correlation data supporting these thresholds as triggers for further evaluation (Machida et al., 2022).

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Basilar Impression (PEDSP-7.4)

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See: **Basilar Impression/Basilar Invagination (PEDHD-9.4)** in the Pediatric Head Imaging Guidelines

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Chiari Malformation (PEDSP-7.5)

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See: **Chiari and Skull Base Malformations (PEDHD-9)** in the Pediatric Head Imaging Guidelines

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Klippel-Feil Anomaly (Congenital Fusion of Cervical Vertebrae) (PEDSP-7.6)

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Criteria

This is generally an incidental finding. A detailed history and physical examination with thorough neurologic examination, and plain x-rays should be performed initially. Klippel-Feil can occur in conjunction with platybasia and/or Chiari malformation.

- Plain x-rays of the cervical spine are sufficient to establish the diagnosis. Advanced imaging is considered medically necessary if there are acute or worsening neurologic symptoms (including pain), or if multiple levels are involved.
  - MRI Cervical Spine without contrast (CPT® 72141) or CT Cervical Spine without contrast (CPT® 72125) for these indications.

Evidence Discussion

Plain x-rays of the cervical spine may be considered medically necessary and sufficient to establish the diagnosis of Klippel-Feil anomaly, as this is typically an incidental finding, while advanced imaging with MRI or CT of the cervical spine may be considered medically necessary when acute or worsening neurologic symptoms are present or multiple vertebral levels are involved, reflecting the recognized association with platybasia and Chiari malformation (Dweck & Lachman, 2019).

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Marfan Syndrome (PEDSP-7.7)

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Criteria

Individuals with Marfan syndrome are at risk for scoliosis (see **Scoliosis (PEDSP-3.2)**) and dural ectasias. Dural ectasias are usually asymptomatic but can be associated with other spinal lesions.

- A pertinent clinical evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- MRI without contrast of the symptomatic spinal region is considered medically necessary for the following:
  - New or worsening clinical symptoms suggest a complicated dural ectasia.
  - The individual is under active consideration for surgery.

Evidence Discussion

A detailed history and physical examination should be performed prior to advanced imaging given the risk of scoliosis and dural ectasia in Marfan syndrome (Child, 2017). MRI without contrast of the symptomatic spinal region may be considered medically necessary when new or worsening symptoms suggest complicated dural ectasia or when surgery is under active consideration, consistent with the recognized potential for dural ectasia to be associated with other spinal lesions despite its typically asymptomatic course (Child, 2017).

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Neurofibromatosis (PEDSP-7.8)

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- See: **Neurofibromatosis 1 and 2 (NF1 and NF2) (PEDONC-2.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines for screening recommendations in neurofibromatosis.
- See: **Neurofibromatosis (PEDPN-2)** in the Pediatric Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines for imaging considerations in neurofibromatosis individuals with known plexiform neurofibromas.
- See: **Non-Rhabdomyosarcoma Soft Tissue Sarcomas (PEDONC-8.3)** in the Pediatric and Special Populations Oncology Imaging Guidelines for imaging in individuals with neurofibromatosis and malignant peripheral nerve sheath tumors.

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Von Hippel-Lindau Syndrome (VHL) (PEDSP-7.9)

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Criteria

- See: **Von Hippel-Lindau Syndrome (VHL) (PEDONC-2.10)** in the Pediatric and Special Populations Oncology Imaging Guidelines for screening recommendations in VHL patients.
- MRI without and with contrast of the affected spinal level is considered medically necessary for individuals with known spinal hemangioblastomas in the following conditions:
  - Annually for asymptomatic individuals with unresected spinal hemangioblastoma(s).
  - Preoperative planning for resection of a hemangioblastoma.
  - New or worsening symptoms suggesting progression of a known hemangioblastoma.

Evidence Discussion

MRI without and with contrast of the affected spinal level may be considered medically necessary annually for asymptomatic unresected spinal hemangioblastoma, for preoperative planning, and when new or worsening symptoms suggest progression, consistent with the natural history of hemangioblastoma growth and surveillance recommendations in VHL (Frantzen et al., 2015).

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Procedure Codes Associated with Spine Imaging (PEDSPINE)

Guideline

Procedure Codes Associated with Spine Imaging (PEDSPINE)

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Procedure Codes Associated with Spine Imaging (PEDSPINE)

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Procedure Codes Associated with Spine Imaging	
MRI	**CPT®**
MRI Cervical without contrast	72141
MRI Cervical with contrast	72142
MRI Cervical without and with contrast	72156
MRI Thoracic without contrast	72146
MRI Thoracic with contrast	72147
MRI Thoracic without and with contrast	72157
MRI Lumbar without contrast	72148
MRI Lumbar with contrast	72149
MRI Lumbar without and with contrast	72158
MRI Unlisted procedure (for radiation planning or surgical software)	76498
MRA	**CPT®**
MRA Spinal Canal	72159
CT	**CPT®**
CT Cervical without contrast	72125
CT Cervical with contrast	72126

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Procedure Codes Associated with Spine Imaging	
CT Cervical without and with contrast	72127
CT Thoracic without contrast	72128
CT Thoracic with contrast	72129
CT Thoracic without and with contrast	72130
CT Lumbar without contrast	72131
CT Lumbar with contrast	72132
CT Lumbar without and with contrast	72133
CT Pelvis without contrast	72192
CT Pelvis with contrast	72193
CT Pelvis without and with contrast	72194
CT Guidance for Placement of Radiation Therapy Fields	77014
CT Unlisted procedure (for radiation planning or surgical software)	76497
Nuclear Medicine	**CPT®**
PET Imaging; limited area (this code not used in pediatrics)	78811
PET Imaging: skull base to mid-thigh (this code not used in pediatrics)	78812
PET Imaging: whole body (this code not used in pediatrics)	78813
PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)	78814
PET with concurrently acquired CT; skull base to mid-thigh	78815
PET with concurrently acquired CT; whole body	78816

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Procedure Codes Associated with Spine Imaging	
Bone Marrow Imaging Limited Areas	78102
Bone Marrow Imaging Multiple Areas	78103
Bone Marrow Imaging Whole Body	78104
Nuclear Bone Scan Limited	78300
Nuclear Bone Scan Multiple Areas	78305
Nuclear Bone Scan Whole Body	78306
Bone Scan Three Phase	78315
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (e.g., head, neck, chest, pelvis), single day imaging	78800
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (e.g., abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days	78801
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging	78802
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (e.g., head, neck, chest, pelvis), single day imaging	78803
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, requiring 2 or more days imaging	78804

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Procedure Codes Associated with Spine Imaging	
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (e.g., head, neck, chest, pelvis), single day imaging	78830
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78831
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78832
Ultrasound	**CPT®**
Ultrasound, spinal canal and contents	76800

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