UNITEDHEALTHCARE® COMMUNITY PLAN:
RADIOLOGY IMAGING COVERAGE DETERMINATION GUIDELINE

Pediatric Musculoskeletal Imaging Guidelines (For Ohio Only)

V2.0.2024

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Application (for Ohio Only)

This Medical Policy only applies to the state of Ohio. Any requests for services that are stated as unproven or services for which there is a coverage or quantity limit will be evaluated for medical necessity using Ohio Administrative Code 5160-1-01.

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Guideline Development (Preface-1)

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Guideline Development (Preface-1.1)

Guideline Development (Preface-1.1)

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- The UnitedHealthcare's evidence-based, proprietary clinical guidelines evaluate a range of advanced imaging and procedures, including NM, US, CT, MRI, PET, Radiation Oncology, Sleep Studies, as well as Cardiac, musculoskeletal and Spine interventions.
- UnitedHealthcare reserves the right to change and update the guidelines. The guidelines undergo a formal review annually. UnitedHealthcare's guidelines are based on current evidence supported by major national and international association and society guidelines and criteria, peer-reviewed literature, 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.
- UnitedHealthcare supports the Choosing Wisely initiative (**https://www.choosingwisely.org/**) by the American Board of Internal Medicine (ABIM) Foundation and many national physician organizations, to reduce the overuse of diagnostic tests that are low value, no value, or whose risks are greater than the benefits.

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

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Investigational and Experimental Studies

- 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
  - if 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.

Clinical and Research Trials

- Similar to investigational and experimental studies, clinical trial imaging requests will be considered to determine whether they meet UnitedHealthcare's 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 supported.

Legislative Mandate

- State and federal legislations may need to be considered in the review of advanced imaging requests.

References (Preface-2)

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1. Coverage of Clinical Trials under the Patient Protection and Affordable Care Act; 42 U.S.C.A. § 300gg-8.

Clinical Information (Preface-3)

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Clinical Information (Preface-3.1)
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Clinical Information (Preface-3.1)

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Clinical Documentation and Age Considerations

- UnitedHealthcare's 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. UnitedHealthcare's guidelines are framed by:
  - Clinical presentation of the individual, rather than the studies requested
  - Adequate clinical information that must be submitted to UnitedHealthcare in order to establish medical necessity for advanced imaging or other designated procedures includes, but is not limited to, the following:
    - Pertinent clinical evaluation should include a recent detailed history, physical examination[20] since the onset or change in symptoms, and/or laboratory and 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; x-ray imaging does not have to be within the past 60 days.
      - 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.
  - UnitedHealthcare’s 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

age, comorbidities, and differences in disease natural history between children and adults.
  - Individuals who are 18 years old or younger[19] 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 >18 years old 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 UnitedHealthcare, 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, UnitedHealthcare 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.[1]

Ultrasound

- 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.

  - 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)

- 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 appropriate 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

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.[1]
- 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 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.[2]
- Both contrast CT and MRI may be considered to have the same risk profile with renal failure (GFR <30 mL/min).
- The use of CT contrast should proceed with caution in pregnant and breastfeeding individuals. There is a theoretical risk of contrast toxicity to the fetal and infant thyroid. The procedure can be performed if the specific need for that contrast-enhanced procedure outweighs risk to the fetus. Breastfeeding individuals may reduce this risk by choosing to pump and discard breast milk for 12-24 hours after the contrast injection.
- CT without contrast may be appropriate if clinical criteria for CT with contrast are met AND the individual has:
    - Elevated blood urea nitrogen (BUN) and/or creatinine
    - Renal insufficiency
    - Allergies to iodinated contrast

  - Thyroid disease which could be treated with I-131
  - 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)

- 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 [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.
  - 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 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, 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.
    - Most contrast is gadolinium based and causes T2 brightening of the vascular and extracellular spaces.
    - Some specialized gadolinium and non-gadolinium contrast agents are available, and most commonly used for characterizing liver lesions.
  - MRI with contrast only is rarely appropriate and is usually used to better characterize findings on a recent inconclusive non-contrast MRI, commonly called a completion study.
  - MRI contrast is contraindicated in pregnant individuals.
  - 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 may be considered to have the same risk profile with renal failure (GFR <30 mL/min).[2]
  - Gadolinium can cause Nephrogenic Systemic Fibrosis (NSF). The greater the exposure to gadolinium in individuals with a low GFR (especially if on dialysis), the greater the chance of individuals developing NSF.
  - Multiple studies have demonstrated potential for gadolinium deposition following the use of gadolinium-based contrast agents (GBCAs) for MRI studies.[3,4,5,6,7] 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.[8]

- A CT may be approved in place of an MRI when clinical criteria are met for MRI AND there is a contraindication to having an MRI (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 is contraindicated during pregnancy unless the specific need for that procedure outweighs risk to the fetus.
  - 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 supported 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)

- PET is a nuclear medicine study that uses a positron emitting radiotracer to create cross-sectional and volumetric images based on tissue metabolism.
- 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 indicated for surveillance imaging unless specifically stated in the condition-specific guideline sections.
- PET/MRI is generally not supported, 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 supported, 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.

Overutilization of Advanced Imaging

- A number of recent 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 indicated examination has been ordered for individuals, it may be possible to avoid exposing them to unnecessary risks.[9,10] 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 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 generally 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 indicated if the surgery/procedure is not indicated. Once the procedure has been approved or if the procedure does not require prior authorization, the appropriate pre-procedural imaging may be approved.

References (Preface-3)

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1. Bettmann MA. Frequently Asked Questions: Iodinated Contrast Agents. *RadioGraphics*. 2004;24(suppl_1):S3-S10. doi: 10.1148/rg.24si045519.
2. Andreucci M, Solomon R, Tasanarong A. Side Effects of Radiographic Contrast Media: Pathogenesis, Risk Factors, and Prevention. *BioMed Res Int*. 2014;2014:1-20. doi: 10.1155/2014/741018.
3. McDonald RJ, McDonald JS, Kallmes DF, et al. Intracranial Gadolinium Deposition after Contrast-enhanced MR Imaging. *Radiology*. 2015;275(3):772-782. doi: 10.1148/radiol.15150025.
4. Kanda T, Ishii K, Kawaguchi H, Kitajima K, Takenaka D. High Signal Intensity in the Dentate Nucleus and Globus Pallidus on Unenhanced T1-weighted MR Images: Relationship with Increasing Cumulative Dose of a Gadolinium-based Contrast Material. *Radiology*. 2014;270(3):834-841. doi: 10.1148/radiol.13131669.
5. Olchowy C, Cebulski K, Łasecki M, et al. The presence of the gadolinium-based contrast agent depositions in the brain and symptoms of gadolinium neurotoxicity - A systematic review. Mohapatra S, ed. *PLOS ONE*. 2017;12(2):e0171704. doi: 10.1371/journal.pone.0171704.
6. Ramalho J, Castillo M, AlObaidy M, et al. High Signal Intensity in Globus Pallidus and Dentate Nucleus on Unenhanced T1-weighted MR Images: Evaluation of Two Linear Gadolinium-based Contrast Agents. *Radiology*. 2015;276(3):836-844. doi:10.1148/radiol.2015150872.
7. Radbruch A, Weberling LD, Kieslich PJ, et al. Intraindividual Analysis of Signal Intensity Changes in the Dentate Nucleus After Consecutive Serial Applications of Linear and Macrocyclic Gadolinium-Based Contrast Agents. *Invest Radiol*. 2016;51(11):683-690. doi: 10.1097/rli.0000000000000308.
8. FDA Warns That Gadolinium-Based Contrast Agents (GBCAs) Are Retained in the Body; Requires New Class Warnings. https://www.fda.gov/media/109825/download.
9. Amis ES, Butler PF, Applegate KE, et al. American College of Radiology White Paper on Radiation Dose in Medicine. *J Am Coll Radiol*. 2007;4(5):272-284. doi: 10.1016/j.jacr.2007.03.002.
10. Powell AC, Long JW, Kren EM, Gupta AK, Levin DC. Evaluation of a Program for Improving Advanced Imaging Interpretation. *J Patient Saf*. 2019;15(1):69-75. doi: 10.1097/PTS.0000000000000034.5.
11. FDA. White Paper: Initiative to Reduce Unnecessary Radiation Exposure from Medical Imaging. Page Last Updated: 06/14/2019. https://www.fda.gov/Radiation-EmittingProducts/RadiationSafety/RadiationDoseReduction/ucm199994.htm.
12. Update on FDA approach to safety issue of gadolinium retention after administration of gadolinium-based contrast agents. https://www.fda.gov/media/116492/download.
13. Blumfield E, Swenson DW, Iyer RS, Stanescu AL. Gadolinium-based contrast agents — review of recent literature on magnetic resonance imaging signal intensity changes and tissue deposits, with emphasis on pediatric patients. *Pediatr Radiol*. 2019;49(4):448-457. doi: 10.1007/s00247-018-4304-8.
14. American College of Radiology. ACR – SPR – SRU Practice Parameter for the Performing and Interpreting Diagnostic Ultrasound Examinations. Revised 2017. (Resolution 32). Available at: https://www.acr.org/-/media/ACR/Files/Practice-Parameters/US-Perf-Interpret.pdf.
15. American College of Radiology. ACR–SPR Practice Parameter for Performing FDG-PET/CT in Oncology. Revised 2021. (Resolution 20). Available at: https://www.acr.org/-/media/ACR/Files/Practice-Parameters/FDG-PET-CT.pdf.
16. American College of Radiology. ACR Practice Parameter for Performing and Interpreting Magnetic Resonance Imaging (MRI). Revised 2017. (Resolution 10). Available at: https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-Perf-Interpret.pdf.
17. American College of Radiology. ACR Practice Parameter for Performing and Interpreting Diagnostic Computed Tomography (CT). Revised 2017. (Resolution 22). Available at: https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CT-Perf-Interpret.pdf.
18. Lohrke J, Frenzel T, Endrikat J, et al. 25 Years of Contrast-Enhanced MRI: Developments, Current Challenges and Future Perspectives. *Adv Ther*. 2016;33(1):1-28. doi: 10.1007/s12325-015-0275-4.
19. Implementation Guide: Medicaid State Plan Eligibility Eligibility Groups Mandatory Coverage Infants and Children under Age 19. Available at: https://www.hhs.gov/guidance/document/implementation-guide-medicaid-state-plan-eligibility-eligibility-groups-aeu-mandatory-2.

20. History and Physicals - Understanding the Requirements. Available at: https://www.jointcommission.org/standards/standard-faqs/hospital-and-hospital-clinics/provision-of-care-treatment-and-services-pc/000002272/.
21. Mammarappallil JG, Rankine L, Wild JM, Driehuys B. New Developments in Imaging Idiopathic Pulmonary Fibrosis With Hyperpolarized Xenon Magnetic Resonance Imaging. *J Thorac Imaging*. 2019;34(2):136-150. doi: 10.1097/rti.0000000000000392.
22. Wang JM, Robertson SH, Wang Z, et al. Using hyperpolarized 129Xe MRI to quantify regional gas transfer in idiopathic pulmonary fibrosis. *Thorax*. 2017;73(1):21-28. doi: 10.1136/thoraxjnl-2017-210070.

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3D Rendering (Preface-4.1)

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CPT® 76376 and CPT® 76377

- 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 UnitedHealthcare 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, Mammogram, MRI Breast, US Breast, CT Colonography (virtual colonoscopy), Cardiac MRI, Cardiac CT, or Coronary CTA studies.

- 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.
  - 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.

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CT-, MR-, or Ultrasound-Guided Procedures (Preface-4.2)

PRF.CD.0004.2.A

v2.0.2024

- CT-, MR-, and Ultrasound-guidance procedure codes contain all of the imaging necessary to guide a needle or catheter. It is inappropriate to routinely bill a diagnostic procedure code in conjunction with a guidance procedure code.
- Imaging studies performed as part of a CT-, MR-, or Ultrasound-guided procedure should be reported using the CPT® codes in the following table:

TABLE: Imaging Guidance Procedure Codes

CPT®	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
75989	Imaging guidance for percutaneous drainage with placement of catheter (all modalities)
76942	Ultrasonic guidance for needle placement
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

CPT® 19085 and CPT® 19086

- The proper way to bill an MRI-guided breast biopsy is CPT® 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). Additional lesions should be billed using CPT® 19086.
  - **CPT® 77021** (MR guidance for needle placement) is not an appropriate code for a breast biopsy.

CPT® 75989

- This code is used to report imaging guidance for a percutaneous drainage procedure in which a catheter is left in place.
- This code can be used to report whether the drainage catheter is placed under fluoroscopy, Ultrasound-, CT-, or MR-guidance modality.

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 information provides exact positioning of surgical instruments with regard to the individual's 3D CT images.[3]
- In most cases, the pre-operative CT is a technical-only service that does not require interpretation by a radiologist.
  - 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.

CPT® 77012 (CT) and CPT® 77021 (MR)

- These codes are used to report imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.
- They represent the radiological supervision and interpretation of the procedure and are often billed in conjunction with surgical procedure codes.
  - For example, CPT® 77012 is reported when CT guidance is used to place the needle for a conventional arthrogram.
  - Only codes representing percutaneous surgical procedures should be billed with CPT® 77012 and CPT® 77021. It is inappropriate to use with surgical codes for open, excisional, or incisional procedures.

- **CPT® 77021** (MR guidance for needle placement) is not an appropriate code for breast biopsy.
  - CPT® 19085 would be appropriate for the first breast biopsy site and CPT® 19086 would be appropriate for additional concurrent biopsies.

CPT® 77013 (CT) and CPT® 77022 (MR)

- These codes include the initial guidance to direct a needle electrode to the tumor(s), monitoring for needle electrode repositioning within the lesion, and as necessary for multiple ablations to coagulate the lesion and confirmation of satisfactory coagulative necrosis of the lesion(s) and comparison to pre-ablation images.
  - **NOTE:** CPT® 77013 should only be used for non-bone ablation procedures.
    - CPT® 20982 includes CT guidance for bone tumor ablations.
  - Only codes representing percutaneous surgical procedures should be billed with CPT® 77013 and CPT® 77022. It is inappropriate to use with surgical codes for open, excisional, or incisional procedures.
- CPT® 77012 and CPT® 77021 (as well as guidance codes CPT® 76942 [US], and CPT® 77002 - CPT® 77003 [fluoroscopy]) describe radiologic guidance by different modalities.
  - Only one unit of any of these codes should be reported per individual encounter (date of service). The unit of service is considered to be the individual encounter, not the number of lesions, aspirations, biopsies, injections, or localizations.

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Unlisted Procedures/Therapy Treatment Planning (Preface-4.3)

PRF.CD.0004.3.UOH
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CPT ®	Description
76497	Unlisted CT procedure (e.g., diagnostic or interventional)
76498	Unlisted MR procedure (e.g., diagnostic or interventional)
78999	Unlisted procedure, diagnostic nuclear medicine

- 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) can be considered in the following clinical scenarios:
  - Studies done for navigation and planning for neurosurgical procedures (i.e., Stealth or Brain Lab Imaging)[1,2]
  - 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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CPT® 76380 Limited or Follow-up CT (Preface-4.5)

PRF.CD.0004.5.UOH

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- 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 indicated 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)

PRF.CD.0004.6.A

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- 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)

PRF.CD.0004.7.UOH

v2.0.2024

- 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.[4]
  - CPT® 76140 is the appropriate code to use for an exam which was completed elsewhere and a secondary interpretation of the images is requested.[5]

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Quantitative MR Analysis of Tissue Composition (Preface-4.8)

PRF.CD.0004.8.A

v2.0.2024

- 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. At present, these procedures are primarily being used in clinical trials and there is no widely recommended indications in clinical practice. As such, these procedures are considered to be investigational and experimental for coverage purposes.
  - CPT® 0648T (without diagnostic MRI) and CPT® 0649T (with diagnostic MRI) refer to data analysis with and without associate imaging of a single organ, with its most common use being LiverMultiScan (LMS).
    - See **Fatty Liver (AB-29.2)** in the Abdomen Imaging Guidelines.
  - CPT® 0697T (without diagnostic MRI) and CPT® 0698T (with diagnostic MRI) refer to data analysis with and without associate imaging of a multiple organs, with its most common use being CoverScan.

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HCPCS Codes (Preface-4.9)

PRF.CD.0004.9.UOH

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- 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.[6]
  - 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.

References (Preface-4)

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1. Society of Nuclear Medicine and Molecular Imaging Coding Corner. Available at: http://www.snmmi.org/ClinicalPractice/CodingCornerPT.aspx?ItemNumber=1786.
2. Intraoperative MR. Brainlab. Available at: https://www.brainlab.com/surgery-products/overview-neurosurgery-products/intraoperative-mr/
3. Experience the Advanced 3D Sinus Surgery Planning with Scopis Building Blocks planning software. Scopis Planning. Available at: http://planning.scopis.com/.
4. ACR Radiology Coding Source™ March-April 2007 Q and A. Available at: https://www.acr.org/Advocacy-and-Economics/Coding-Source/ACR-Radiology-Coding-Source-March-April-2007-Q-and-A.
5. Chung CY, Alson MD, Duszak R, Degnan AJ. From imaging to reimbursement: what the pediatric radiologist needs to know about health care payers, documentation, coding and billing. *Pediatr Radiol*. 2018;48(7):904-914. doi: 10.1007/s00247-018-4104-1.
6. HCPCS - General Information from CMS.gov. Available at: www.cms.gov/medicare/coding/medhcpcsgeninfo.

Whole-Body Imaging (Preface-5)

Guideline

Whole-Body CT Imaging (Preface-5.1)
Whole-Body MR Imaging (Preface-5.2)
PET-MRI (Preface-5.3)
References (Preface-5)

Whole-Body CT Imaging (Preface-5.1)

PRF.WB.0005.1.UOH

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- Whole-body CT or LifeScan (CT Brain, Chest, Abdomen, and Pelvis) for screening of asymptomatic individuals is not indicated. 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 CT is supported for oncologic staging in Multiple Myeloma. See **Multiple Myeloma and Plasmacytomas (ONC-25)** in the Oncology Imaging Guidelines.

Whole-Body MR Imaging (Preface-5.2)

PRF.WB.0005.2.A

v2.0.2024

- Whole-body MRI (WBMRI) is, with the exception of select cancer predisposition syndromes and autoimmune conditions discussed below, generally not supported 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)** , **Hereditary Paraganglioma-Pheochromocytoma (HPP) Syndromes (PEDONC-2.13)** , or **Constitutional Mismatch Repair Deficiency (CMMRD or Turcot Syndrome) (PEDONC-2.15)** in the Pediatric Oncology Imaging Guidelines.
  - Cancer staging and restaging:
    - While the feasibility of WBMRI has been established, data remain conflicting on whether WBMRI is of equivalent diagnostic accuracy compared with standard imaging modalities such as CT, scintigraphy, and PET imaging.
    - Evidence has not been published establishing WBMRI as a standard evaluation for any type of cancer.
  - Autoimmune disease:
    - 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)

PRF.WB.0005.3.A

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- PET-MRI is generally not supported for a vast majority of oncologic and neurologic conditions due to lack of standardization in imaging technique and interpretation. However, it may be appropriate 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 is a pediatric patient or being treated under a pediatric guideline and treatment plan AND
    - 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.
- For more information, see **PET Imaging in Pediatric Oncology (PEDONC-1.4)** in the Pediatric Oncology Imaging Guidelines, and **PET Brain Imaging (PEDHD-2.3)** and **Special Imaging Studies in Evaluation for Epilepsy Surgery (PEDHD-6.3)** in the Pediatric Head Imaging Guidelines.

References (Preface-5)

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1. Villani A, Tabori U, Schiffman J, et al. Biochemical and imaging surveillance in germline TP53 mutation carriers with Li-Fraumeni syndrome: a prospective observational study. *Lancet Oncol*. 2011;12(6):559-567. doi: 10.1016/S1470-2045(11)70119-X.
2. Siegel MJ, Acharyya S, Hoffer FA, et al. Whole-Body MR Imaging for Staging of Malignant Tumors in Pediatric Patients: Results of the American College of Radiology Imaging Network 6660 Trial. *Radiology*. 2013;266(2):599-609. doi: 10.1148/radiol.12112531.
3. Antoch G. Whole-Body Dual-Modality PET/CT and Whole-Body MRI for Tumor Staging in Oncology. *JAMA*. 2003;290(24):3199. doi: 10.1001/jama.290.24.3199.
4. Lauenstein TC, Semelka RC. Emerging techniques: Whole-body screening and staging with MRI. *J Magn Reson Imaging*. 2006;24(3):489-498. doi: 10.1002/jmri.20666.
5. Khanna G, Sato TSP, Ferguson P. Imaging of Chronic Recurrent Multifocal Osteomyelitis. *RadioGraphics*. 2009;29(4):1159-1177. doi: 10.1148/rg.294085244.
6. Ferguson PJ, Sandu M. Current Understanding of the Pathogenesis and Management of Chronic Recurrent Multifocal Osteomyelitis. *Curr Rheumatol Rep*. 2012;14(2):130-141. doi: 10.1007/s11926-012-0239-5.
7. National Comprehensive Cancer Network® (NCCN®). NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Genetic/Familial High Risk Assessment: Breast, Ovarian, and Pancreatic. Version 3.2023. February 13, 2023. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic V.3.2023. ©National Comprehensive Cancer Network, Inc. 2023. All rights reserved. Accessed July 10, 2023. The NCCN Guidelines® and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines®, go online to NCCN.org.

References (Preface-6)

Guideline

References (Preface-6.1)

References (Preface-6.1)

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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.
- The website addresses for certain references are included in the body of the guidelines but are not hyperlinked to the actual website.
- The website address for the American College of Radiology (ACR) Appropriateness Criteria® is http://www.acr.org.

Copyright Information (Preface-7)

Guideline

Copyright Information (Preface-7.1)

Copyright Information (Preface-7.1)

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Trademarks (Preface-8)

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Trademarks (Preface-8.1)

Trademarks (Preface-8.1)

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General Guidelines (PEDMS-1.0)

Guideline

Procedure Codes Associated with Musculoskeletal Imaging (PEDMS)
General Guidelines (PEDMS-1.0)
Age Considerations (PEDMS-1.1)
Appropriate Clinical Evaluation and Conservative Treatment (PEDMS-1.2)
Modality General Considerations (PEDMS-1.3)
References (PEDMS-1)

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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	CPT®
MRA Lower Extremity	73725

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	CPT®
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
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

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, 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
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

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 (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
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
Ultrasound, other soft tissue areas not otherwise specified	76999
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

Ultrasound	CPT®
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

General Guidelines (PEDMS-1.0)

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- A pertinent clinical evaluation 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) can serve as a pertinent clinical evaluation.
- Plain x-ray should be done prior to advanced imaging. 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. X-ray can rule out those situations that do not require advanced imaging, such as acute/healing fracture, osteomyelitis, and tumors of bone amenable to biopsy or radiation therapy (in known metastatic disease), etc.
  - Even in soft tissue masses, plain x-rays are helpful in evaluating for calcium/bony deposits, e.g. myositis ossificans and invasion of bone.
- 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 include any or all of the following: R.I.C.E (rest, ice, compression, and elevation), NSAIDs (non-steroidal anti-inflammatory drugs), narcotic and non-narcotic analgesic medications, oral or injectable corticosteroids, viscosupplementation injections, a provider-directed home exercise program, cross-training, physical medicine, or immobilization by splinting/casting/bracing.
- These guidelines are based upon using advanced imaging to answer specific clinical questions that will affect patient management. Imaging is not indicated if the results will not affect individual management decisions. Standard medical practice would dictate continuing conservative therapy prior to advanced imaging in individuals who are improving on current treatment programs.

Age Considerations (PEDMS-1.1)

MSP.GG.0001.1.A

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- Many conditions affecting the musculoskeletal system 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 ≤18 years old 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 >18 years old should be imaged according to the General Musculoskeletal Imaging Guidelines except where directed otherwise by a specific guideline section.

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Appropriate Clinical Evaluation and Conservative Treatment (PEDMS-1.2)

MSP.GG.0001.2.A
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- See: **General Guidelines (PEDMS-1.0)**

Modality General Considerations (PEDMS-1.3)

MSP.GG.0001.3.A
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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 patient 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.
      - 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 eviCore 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.
    - 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 beginning 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 indicated for evaluation of suspected loosening of orthopedic prostheses when recent plain x-ray is nondiagnostic.
    - Nuclear medicine bone marrow imaging (CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104), SPECT (CPT® code: 78803), or SPECT/CT (CPT® 78830) is indicated for detection of ischemic or infarcted regions in sickle cell disease.
    - Triple phase bone scan (CPT® 78315) is indicated 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.

- 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.

References (PEDMS-1)

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1. ACR–ASER–SCBT-MR–SPR Practice Parameter for the performance of pediatric computed tomography (CT). Revised 2019 (Resolution 6). https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CT-Ped.pdf?la=en
2. ACR–SPR–SSR Practice Parameter for the performance of radiography of the extremities. Revised 2018 (Resolution 6). https://www.acr.org/-/media/ACR/Files/Practice-Parameters/Rad-Extremity.pdf?la=en
3. ACR Practice Parameter for performing and interpreting magnetic resonance imaging (MRI). Revised 2022 (Resolution 8). https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-Perf-Interpret.pdf.
4. Biassoni L, Easty M. Paediatric nuclear medicine imaging. *Br Med Bull*. 2017;123(1):127-148. doi:10.1093/bmb/ldx025.
5. Ing C, DiMaggio C, Whitehouse A, et al. Long-term differences in language and cognitive function after childhood exposure to anesthesia. *Pediatrics.* 2012;130(3):e476-e485. doi:10.1542/peds.2011-3822d.
6. Monteleone M, Khandji A, Cappell J, et al. Anesthesia in children: perspectives from nonsurgical pediatric specialists. *J Neurosurg Anesthesiol.* 2014;26(4):396-398. doi;10.1097/ana.0000000000000124.
7. DiMaggio C, Sun LS, Li G. Early Childhood exposure to anesthesia and risk of developmental and behavioral disorders in a sibling birth cohort. *Anesth Analg.* 2011;113(5):1143-1151. doi:10.1213/ane.0b013e3182147f42.
8. Hindorf C, Glatting G, Chiesa C, et al. EANM Dosimetry committee guidelines for bone marrow and whole body dosimetry. *Eur J Nucl Med Mol Imaging*. 2010;37(6):1238-1250. doi:10.1007/s00259-010-1422-4.
9. Hryhorczuk AL, Restropo R. Pediatric musculoskeletal ultrasound: practical imaging approach. *AJR.* 2016;206:W62-W72. doi:10.2214/AJR.15.15858.
10. Fraum TJ, Ludwig DR, Bashir MR, et al. Gadolinium-based contrast agents: a comprehensive risk assessment. *J. Magn. Reson. Imaging*. 2017;46(2):338–353. doi:10.1002/jmri.25625.
11. FDA Medical Imaging Drug Advisory Committee meeting 9/8/17 Minutes available at: https://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/Drugs/MedicalImagingDrugsAdvisoryCommittee/UCM574746.pdf.
12. Siegel MJ. Musculoskeletal system and vascular imaging. In: Zinner S, Fischer A, eds.*Pediatric sonography*. 5th ed. Philadelphia, PA:. Wolters Kluwer; 2018:601-11.
13. Fotenos, A. *Update on FDA approach to safety issue of gadolinium retention after administration of gadolinium-based contrast agents*. FDA. https://www.fda.gov/media/116492/download. Accessed April 22, 2020.
14. Blumfield E, Swenson DW, Iyer RS, Stanescu AL. Gadolinium-based contrast agents – review of recent literature on magnetic resonance imaging signal intensity changes and tissue deposits, with emphasis on pediatric patients. *Pediatric Radiology.* 2019;49(4):448-457. doi:10.1007/s00247-018-4304-8.

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)
Physical Child Abuse (PEDMS-2.7)
References (PEDMS-2)

Fracture and Dislocation (PEDMS-2)

MSP.FX.0002.0.A

v1.0.2024

- A pertinent clinical evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging.

Acute Fracture (PEDMS-2.1)

MSP.FX.0002.1.A

v1.0.2024

- 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 generally indicated except in complex (comminuted or displaced) joint fractures where MRI or CT without contrast can be approved for preoperative planning.
  - 3D Rendering may sometimes be indicated for complex fracture repairs. See: **3D Rendering (MS-3)** in the Musculoskeletal Imaging Guidelines.
- Ultrasound (CPT® 76881 or CPT® 76882) may be approved for evaluation of fracture, but is not required to allow for other advanced imaging[12], especially in infants[13].
- CT or MRI without contrast is indicated if plain x-rays are negative or equivocal for fracture, and fracture or bone marrow edema is still clinically suspected, and if the results will determine immediate treatment decisions as documented by the treating physician.[12]
- Bone scan may be approved for evaluation of suspected 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
  - See: **Stress/Occult Fracture (PEDMS-2.5)** for bone scan indications

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Joint-Adjacent Fracture (PEDMS-2.2)

MSP.FX.0002.2.A

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- CT without contrast can be approved in complex (comminuted or displaced) fractures seen on plain x-ray involving a joint for preoperative planning.
- CT without contrast can be approved when there is clinical concern for delayed union or non-union of fracture or joint fusions on follow-up plain x-ray.

Growth Plate Injuries (Salter-Harris Fractures) (PEDMS-2.3)

MSP.FX.0002.3.A

v1.0.2024

- 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 may be indicated 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 indicated.
- MRI without contrast is indicated 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, which may result in abnormal growth.
- Compressive injuries of the growth plate (Salter-Harris V) injuries may be difficult to identify on plain films, and MRI without contrast is indicated for confirmation.

Osteochondral or Chondral Fractures, Including Osteochondritis Dissecans (PEDMS-2.4)

MSP.FX.0002.4.A

v1.0.2024

An osteochondral fracture is a tear of the cartilage which covers the end of a bone, within a joint. It is also known as Osteochondritis Dissecans. In both disorders, loose bone fragments may form in a joint.

- If x-rays are negative and an osteochondral fracture is still suspected, or if x-ray or clinical exam suggests an unstable osteochondral injury, either MRI without contrast, MR arthrogram, or CT arthrogram of the involved joint is indicated.
- If plain x-rays show a non-displaced osteochondral fragment, follow up imaging should be with plain x-rays. Advanced imaging is not necessary.
- MRI without contrast or CT without contrast is indicated when healing cannot be adequately assessed on follow up plain x-rays.[11]

Stress/Occult Fracture (PEDMS-2.5)

MSP.FX.0002.5.A

v1.0.2024

- These fractures can usually be adequately evaluated by history, physical exam, and x-ray. Advanced imaging may be appropriate 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 indicated, 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) may be approved 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 indicated OR
  - Bone scan (CPT® 78315, 78306, or 78300), SPECT/CT (CPT® 78830), or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) may be approved in place of MRI or CT if provider requests
- Periodic follow-up plain x-rays will usually show progressive healing.
  - CT without contrast is indicated when there is clinical concern for non-union.

Compartment Syndrome (PEDMS-2.6)

MSP.FX.0002.6.A

v1.0.2024

- Acute compartment syndrome is a clinical diagnosis made by direct measurement of compartment pressure and is a surgical emergency. Advanced imaging is not indicated.
- See: **Chronic Exertional Compartment Syndrome (MS-11.3)** for imaging guidelines.

Physical Child Abuse (PEDMS-2.7)

MSP.FX.0002.7.A

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- See: **Suspected Physical Child Abuse (PEDMS-7)** for imaging guidelines

References (PEDMS-2)

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1. Mintz DN, Roberts CC, Bencardino JT, et al. ACR Appropriateness Criteria®. Chronic hip pain. Date of origin: 1985. Last review date: 2022. https://acsearch.acr.org/docs/69425/Narrative.
2. Bruno MA, Weissman BN, Kransdorf MJ, et al. ACR Appropriateness Criteria®. Acute hand and wrist trauma. Date of origin: 1998. Last review date: 2018. https://acsearch.acr.org/docs/69418/Narrative/
3. Luchs JS, Flug JA, Weissman BN, et al. ACR Appropriateness Criteria®. Chronic ankle pain. Date of origin: 1998. Last review date: 2017. https://acsearch.acr.org/docs/69422/Narrative.
4. Taljanovic MS, Chang EY, Ha AS, et al. ACR Appropriateness Criteria®. Acute Trauma to the Knee. Last review date: 2019. https://acsearch.acr.org/docs/69419/Narrative/.
5. Bencardino JT, Stone TJ, Roberts CC, et al. ACR Appropriateness Criteria®. Stress (fatigue/insufficiency) fracture, including sacrum, excluding other vertebrae. Last review date: 2016. https://acsearch.acr.org/docs/69435/Narrative/.
6. Borsa JJ, Peterson HA, Ehman RL. MR imaging of physeal bars. *Radiology*. 1996;199(3):683-687. doi:10.1148/radiology.199.3.8637987.
7. Rodrigo RM, Vilanova JC, Martel J. Sports injuries in children and adolescents: a case-based approach. New York, NY: Springer; 2014.
8. Wootton-Gorges SL, Soares BP, Alazraki AL, et al. ACR Appropriateness Criteria®. Suspected physical abuse—child. Last review date: 2016. https://acsearch.acr.org/docs/69443/Narrative/.
9. Christian CW, Crawford-Jakubiak JE, Flaherty EG, et al. AAP Clinical Practice Guideline: The evaluation of suspected physical child abuse. *Pediatrics*. 2015;135(5):e1337-e1354. doi:10.1542/peds.2015-0356 .
10. Nguyen JC, Markhardt BK, Merrow AC, Dwek JR. Imaging of pediatric growth plate disturbances. *RadioGraphics*. 2017;37(6):1791-812.
11. Ecklund K. Sports-related injuries of the pediatric musculoskeleton: lower extremity. 2021. In: Hodler J, Kubik-Huch RA, von Schulthess GK, eds. Musculoskeletal Diseases 2021-2024: Diagnostic Imaging [Internet]. Cham (CH): Springer; 2021. Chapter 19. PMID: 33950618.
12. Kraus R, Dresing K. Rational usage of fracture imaging in children and adolescents. *Diagnostics (Basel)*. 2023;13(3):538. doi:10.3390/diagnostics13030538.
13. Chauvin NA, Khwaja A. Musculoskeletal imaging in neonates: use of ultrasound. *Pediatr Radiol*. 2022;52(4):765-776. doi:10.1007/s00247-021-05152-2.

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)
References (PEDMS-3)

Soft Tissue and Bone Masses – General Considerations (PEDMS-3.1)

MSP.ST.0003.1.A

v1.0.2024

- A pertinent clinical evaluation including a detailed history, physical examination, with detailed information on the mass (including location, size, duration, solid vs. cystic, fixed vs. not fixed to bone) should be performed prior to considering advanced imaging.
- Evaluation by a surgical specialist or oncologist is strongly recommended to help determine the most helpful advanced imaging studies for an individual.
- 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. 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.
- Ultrasound (CPT® 76881 or CPT® 76882) 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 ≥1 year
  - Vascular malformations (see: **Vascular Anomalies (PEDPVD-2)** in the Pediatric Peripheral Vascular Disease Imaging Guidelines)
- Advanced imaging is not indicated for the following entities:
  - Ganglion cysts
  - Sebaceous cysts
  - Hematomas
  - Subcutaneous lipomas
    - 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 indicated for lipomas in other locations (not subcutaneous).

Soft Tissue Mass with Negative X-ray and Abnormal Ultrasound (PEDMS-3.2)

MSP.ST.0003.2.A

v1.0.2024

- MRI without and with contrast is indicated when plain x-ray is negative and ultrasound is abnormal.
  - CT without or with contrast is indicated if MRI is contraindicated.

Soft Tissue Mass with Calcification/ Ossification on X-ray (PEDMS-3.3)

MSP.ST.0003.3.A

v1.0.2024

- MRI without and with contrast is indicated when calcification/ossification is noted on plain x-ray.
  - CT without or with contrast is indicated if MRI is contraindicated.

Mass Involving Bone (Including Suspected Lytic and Blastic Metastatic Disease) (PEDMS-3.4)

MSP.ST.0003.4.A

v1.0.2024

- Complete radiograph of the entire bone containing the lesion of bone is required prior to consideration of advanced imaging. Many benign bone tumors have a characteristic appearance on plain x-ray and advanced imaging is not necessary unless one of the following applies:
  - MRI without and with contrast and/or CT without may be indicated for preoperative planning.
  - MRI without and with contrast when the diagnosis is uncertain based on plain x-ray appearance.
    - CT without or with contrast can be approved if MRI is contraindicated.
- Surveillance of benign bony lesions is with plain x-ray[11]
  - MRI without and with contrast may be approved 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 Oncology Imaging Guidelines.
- If there is concern for metastatic disease in an individual with a known malignancy, refer to the appropriate Pediatric Oncology Imaging Guideline.

References (PEDMS-3)

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1. ACR–SPR–SSR Practice parameter for the performance and interpretation of magnetic resonance imaging (MRI) of bone and soft tissue tumors. Revised 2020 (Resolution 30) https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MR-SoftTissue-Tumors.pdf?la=en.
2. Arndt CAS. Soft Tissue Sarcomas. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:2685-2688.
3. Arndt CAS. Neoplasms of bone. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:2689-2697.
4. Eutsler EP, Siegel MJ. Musculoskeletal system and vascular imaging. In: Zinner S, Fischer A, eds.*Pediatric sonography*. 5th ed. Philadelphia, PA:. Wolters Kluwer; 2018:601-11.
5. Johnson CM, Navarro OM. Clinical and sonographic features of pediatric soft-tissue vascular anomalies part I: classification, sonographic approach and vascular tumors. *Pediatr Radiol*. 2017;47(9):1184-95. doi:10.1007/s00247-017-3885-y.
6. Johnson CM, Navarro OM. Clinical and sonographic features of pediatric soft-tissue vascular anomalies part 2: vascular malformations. *Pediatr Radiol.* 2017;47(9):1196-1208. doi:10.1007/s00247-017-3906-x.
7. Morrison WB, Weissman BN, Kransdorf MJ, et al. *ACR Appropriateness Criteria®.* Primary bone tumors. Date of origin: 1995. Last review date: 2019. https://acsearch.acr.org/docs/69421/Narrative/.
8. Mintz DN, Roberts CC, Bencardino JT, et al. *ACR Appropriateness Criteria®.* Chronic hip pain. Last review 2022. https://acsearch.acr.org/docs/69425/Narrative/.
9. Sargar KM, Sheybani EF, Shenoy A, Aranake-Chrisinger J, Khanna G. Pediatric fibroblastic and myofibroblastic tumors: a pictorial review. *RadioGraphics*. 2016;36:1195-1214. doi:10.1148/rg.2016150191.
10. Sheybani EF, Eutsler EP, Navarro OM. Fat-containing soft-tissue masses in children. *Pediatr radiol*. 2016;46(13):1760-73. doi:10.1007/s00247-016-3690-z.
11. Collier CD, Nelson GB, Conry KT, Kosmas C, Getty PJ, Liu RW. The natural history of benign bone tumors of the extremities in asymptomatic children: A longitudinal radiographic study. *J Bone Joint Surg Am.* 2021;103(7):575-580. doi:10.2106/JBJS.20.00999. PMID: 33646982.

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)
References (PEDMS-4)

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General Evaluation of the Limping Child (PEDMS-4.1)

MSP.LC.0004.1.A

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- This guideline primarily applies to children under the age of 6 years. It may also be applied to older children with pre-existing conditions who may not be able to communicate, such as a child with severe intellectual disability. Many of these cases will be urgent, because of the risk of adverse outcomes in 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.[5]

Limping Child with Suspected Trauma (PEDMS-4.2)

MSP.LC.0004.2.A

v1.0.2024

- Plain radiographs 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 radiographs, and if a fracture is demonstrated, additional imaging may not be required.
- If initial radiographs are negative, but limping symptoms or avoidance of weight-bearing persist, follow-up radiographs in 7 to 10 days are indicated.
  - If plain films are negative and suspicion remains high for stress fractures or soft tissue injury:
    - 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) may be approved if implanted hardware or devices precluding MRI are present.
- CT use is limited in the evaluation of the limping child with suspected trauma.

Limping Child with Suspected Infection (PEDMS-4.3)

MSP.LC.0004.3.A
v1.0.2024

- 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 radiographs should be obtained if no hip joint effusion is demonstrated.
    - MRI without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is indicated if plain films are not diagnostic.
- Pain localized distal to hip:
  - MRI without contrast or without and with contrast of the affected body part if plain radiographs are not diagnostic.
- Nonlocalized pain:
  - Plain radiographs of the spine, pelvis, and lower extremities may be necessary to localize the abnormality.
  - If plain radiography is not diagnostic and suspicion for infection remains high:
    - 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

Limping Child with No Evidence of Trauma or Infection (PEDMS-4.4)

MSP.LC.0004.4.A
v1.0.2024

- This differential diagnosis is quite broad.
  - Transient (or toxic) synovitis of the hip:
    - Ultrasound of the hip (CPT® 76881 or CPT® 76882) is the preferred initial exam.
      - Plain radiographs 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, see: **Avascular Necrosis (AVN)/ Legg-Calvé-Perthes Disease (PEDMS-6)**
  - Juvenile Idiopathic Arthritis, see: **Juvenile Idiopathic Arthritis (PEDMS-10.1)**
  - Histiocytic Disorders, see: **Histiocytic Disorders (PEDONC-18)** in the Pediatric Oncology Imaging Guidelines
  - Neoplasm, see: **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 Oncology Imaging Guidelines
  - Child abuse, see: **Suspected Physical Child Abuse (PEDMS-7)**

References (PEDMS-4)

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1. Sadfar NM, Rigsby CK, Iyer RS, et al. *ACR Appropriateness Criteria®*. Limping child—Ages 0-5 Years. Date of origin: 1995. Last review date: 2018. https://acsearch.acr.org/docs/69361/Narrative/
2. Herman MJ, Martinek M. The limping child. *Pediatr Rev.* 2015;36(5):184-197. doi:10.1542/pir.36-5-184.
3. Chaturvedi A, Rupasov A. The acutely limping preschool and school-age child: an imaging perspective. *Semin Musculoskelet Radiol.* 2018;22(1):46-56. doi:10.1055/s-0037-1608001.
4. Thapa M, Vo JN, Shiels WE. Ultrasound-guided musculoskeletal procedures in children. *Pediatr Radiol.* 2013;43:55-60. doi:10.1007/s00247-012-2599-4.
5. Karout L, Naffaa L. Pediatric hip disorders: imaging guidelines and recommendations. *Radiol Clin North Am*. 2022;60(1):149-163. doi:10.1016/j.rcl.2021.08.007.

Developmental Dysplasia of the Hip (PEDMS-5)

Guideline

Developmental Dysplasia of the Hip (PEDMS-5)
References (PEDMS-5)

Developmental Dysplasia of the Hip (PEDMS-5)

MSP.DZ.0005.A

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Developmental dysplasia of the hip (DDH) was formerly known as congenital dislocation of the hip. DDH includes a spectrum of abnormalities including abnormal acetabular shape (dysplasia) and malposition of the femoral head ranging from mild subluxation, dislocatable hip to fixed dislocation. 60 to 80% of abnormalities are identified by physical exam, and more than 90% are identified by ultrasound. Treatment may involve placement in a Pavlik harness, casting, or surgery in extreme or refractory cases.

Screening studies

- The routine use of ultrasound in screening neonates and infants without risk factors for DDH is not recommended by the American Academy of Pediatrics and the American Academy of Orthopedic Surgeons.
- There are two sonographic methods of evaluating the hip: the dynamic stress (Harcke) technique and the static (Graf) technique
- Screening ultrasound (CPT® 76885 or CPT® 76886) is recommended for infants between 4 weeks[8] 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 preferred imaging modality as femoral head ossification is often seen on x-ray in normal patients
  - If x-ray is inconclusive, ultrasound (CPT® 76885 or CPT® 76886) may be indicated
- Indications for follow-up hip ultrasound (CPT® 76885 or CPT® 76886):
  - Type IIA hip was diagnosed on a previous hip ultrasound using the Graf method and follow-up hip ultrasound is requested to confirm normal development.
  - Graf type IIA hip has an alpha angle (bony angle) between 50 to 59 degrees in a child less than 3 months of age.
  - The overwhelming majority of these hips mature spontaneously, but follow-up may be required to ensure that maturation has occurred.
  - Full description of the Graf classification can be found at: http://radiopaedia.org/articles/ultrasound-classification-of-developmental-dysplasia-of-the-hip-1.

  - 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. Follow-up ultrasound is indicated 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 indicated for clinical suspicion of treatment failure, subluxation or dislocation of the hip.
- MRI without contrast (CPT® 73721) or CT without contrast (CPT® 73700) is indicated 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 NOT indicated for the following:
  - Infants less than 2 weeks of age, since hip laxity is normal after birth and usually resolves spontaneously.
  - Infants older than 6 months of age as plain x-ray of the hips become more reliable due to femoral head ossification and should be used in infants over 6 months of age.
  - 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 require referral for treatment rather than follow-up imaging.
  - Plain x-ray of the hips should be performed rather than ultrasound if there is a clinical suspicion for teratogenic dysplasia.

References (PEDMS-5)

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1. Nguyen JC, Dorfman SR, Rigsby CK, et al. ACR appropriateness criteria: Developmental dysplasia of the hip—child. 2018, American College of Radiology. Reston,VA. http://www.jacr.org/article/S1546-1440(09)00189-6/fulltext.
2. Mulpuri K, Song KM, Gross RH, et al. The American Academy of Orthopaedic Surgeons Evidence-Based Guideline on detection and nonoperative management of pediatric developmental dysplasia of the hip in infants up to six months of age. *J Bone Joint Surg Am.* 2015;97(20):1717-1718. doi:10.2106/JBJS.O.00500.
3. Sankar WN, Horn BD, Winell JJ, Wells L. Developmental dysplasia of the hip. In: Kliegman RM, St. Geme JW III, Blum NJ, et.al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:3623-3628.
4. Chin MS, Betz BW, Halanski MA. Comparison of hip reduction using magnetic resonance imaging or computed tomography in hip dysplasia. *J Pediatr Orthop*. 2011;31(5):525-529. doi:10.1097/BPO.0b013e31821f905b.
5. Shaw BA, Segal LS. Evaluation and referral for developmental dysplasia of the hip in infants. *Pediatrics*. 2016;138(6):e20163107. doi:10.1542/peds.2016-3107.
6. Wright J, James K, Developmental dysplasia of the hip. In: Aresti NA, Ramachandran M, Paterson M, Barry M, eds. *Paediatric Orthopedics in Clinical Practice*. London: Springer; 2016:69-90.
7. Ortiz-Neira CL, Paolucci EO, Donnon T. A meta-analysis of common risk factors associated with the diagnosis of developmental dysplasia of the hip in newborns. *Euro J Radiol*. 2012;8:e344-e351. doi:10.1016/j.ejrad.2011.11.003.
8. Karout L, Naffaa L. Pediatric hip disorders: imaging guidelines and recommendations. *Radiol Clin North Am.* 2022;60(1):149-163. doi:10.1016/j.rcl.2021.08.007.

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)
References (PEDMS-6)

Avascular Necrosis and Legg-Calvé-Perthes Disease (PEDMS-6.1)

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- Plain x-ray is the initial imaging study and may be all that is necessary for follow-up[11].
- MRI Hip either without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is indicated if the diagnosis is uncertain on plain x-ray[10].
  - If MRI is contraindicated or unavailable, any one of the following studies may be approved in lieu of MRI:
    - CT scan without contrast, OR
    - Nuclear bone scan (CPT® codes: 78300, 78305, 78306, or 78803) OR
    - SPECT/CT (CPT® 78830)

Osteonecrosis (PEDMS-6.2)

MSP.AN.0006.2.A

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- Osteonecrosis can occur in a number of conditions, including during treatment for developmental dysplasia of the hip.
- 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 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 Oncology Imaging Guidelines.
- X-ray is indicated as initial imaging study[10]
- MRI either without contrast or without and with contrast in other individuals with concern for osteonecrosis and inconclusive recent x-ray, if imaging results will change current individual management.
  - CT scan without contrast may be appropriate for surgical planning[8]

References (PEDMS-6)

v1.0.2024

1. Boutault JR, Baunin C, Bérard E, et al. Diffusion MRI of the neck of the femur in Legg-Calvé-Perthes disease: a preliminary study. *Diagn Interv Imaging*. 2013; 94(1):78-83. doi:10.1016/j.diii.2012.10.003.
2. Dillman JR, Hernandez RJ. MRI of Legg-Calvé-Perthes Disease. *AJR Am J Roentgenol.* 2009;193(5):1394-1407. doi:10.2214/AJR.09.2444.
3. Divi SN, Bielski RJ. Legg-Calvé-Perthes Disease. Pediatric annals. 2016 Apr 14;45(4):e144-9.
4. Gough-Palmer A, McHugh K. Investigating hip pain in a well child. *BMJ.* 2007;334:1216-1217. doi:10.1136/bmj.39188.515741.47.
5. Hindorf C, Glatting G, Chiesa C, et al. EANM Dosimetry Committee guidelines for bone marrow and whole body dosimetry. *Eur J Nucl Med Mol Imagin*g. 2010;37(6):1238-1250. doi:10.1007/s00259-010-1422-4.
6. Kaste SC, Karimova EJ, Neel MD. Osteonecrosis in children after therapy for malignancy. *AJR Am J Roentgenol*. 2011;196(5):1011-18. doi:10.2214/AJR.10.6073.
7. Laine J, Martin BD, Novotny SA, et al. Role of advanced imaging in the diagnosis and management of active Legg-Calvé-Perthes Disease. *J Am Acad Orthop Surg*. 2018;26:526-36. doi:10.5435/JAAOS-D-16-00856.
8. Murphey MD, Foreman KL, Klassen-Fischer MK, Fox MG, Chung EM, Kransdorf MJ. From the radiologic pathology archives imaging of osteonecrosis: radiologic-pathologic correlation. *Radiographics.* 2014;34:1003-1028. doi:10.1148/rg.344140019.
9. Sankar WN, Winell JJ, Horn DB, Wells L. Legg-Calve-Perthes Disease. In: Kliegman RM, St. Geme JW III, Blum NJ, et.al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:3628-3631.
10. Ha AS, Chang EY, Bartolotta RJ, et. al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *J Am Coll Radiol*. 2022;19(11S):S409-S416. doi: 10.1016/j.jacr.2022.09.009.
11. Divi SN, Bielski RJ. Legg-Calvé-Perthes Disease. *Pediatr Ann*. 2016;45(4):e144-9. doi:10.3928/00904481-20160310-03.

Suspected Physical Child Abuse (PEDMS-7)

Guideline

Suspected Physical Child Abuse (PEDMS-7)
References (PEDMS-7)

Suspected Physical Child Abuse (PEDMS-7)

MSP.AB.0007.A
v1.0.2024

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.

Child abuse injuries may affect any organ or system. Fractures are common, but injuries may also involve solid and hollow visceral organs, and/or superficial and deep soft tissue injuries. 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, but fractures may occur in any bone. Unsuspected fractures, multiple fractures at various stages of healing, or fractures of a configuration or distribution inconsistent with the history provided, may raise the suspicion for physical abuse.

Skeletal Injury

- The radiographic 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 indicated, but more tailored radiographic evaluation based on history and physical examination may be preferable to skeletal survey.
- When skeletal survey is negative, but clinical suspicion remains high:
  - 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 radiographs. 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 should be approved.
- CT Chest without contrast (CPT® 71250) is indicated in patients with a negative skeletal survey and a high clinical suspicion for rib fracture associated with child abuse.[8]
- 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

Head Injury

- CT Head without contrast (CPT® 70450) is indicated when there is clinical evidence of head injury or when skull fracture of any age is detected on survey skull x-ray.[7]
  - CT Head without contrast (CPT® 70450) is also indicated when known or suspected cervical trauma is present in a pediatric individual.
  - CT Head without contrast (CPT® 70450) is indicated 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) may also be approved.[1]
  - MRI Spine without contrast (CPT® 72141, 72146, 72148) or without and with contrast (CPT® 72156, 72157, 72158) may be approved 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) may be approved if MRI is not readily available.[9]
- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated to further 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 indicated for suspected injury to the abdomen or pelvis[6,7]:
  - 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 indicated 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) may be approved. Contact children aged 12 to 24 months should undergo skeletal survey. No routine imaging is indicated in asymptomatic children older than 24 months.[10]

References (PEDMS-7)

v1.0.2024

1. Wooten-Gorges SL, Soares BP, Alazarki AL, et al. *ACR Appropriateness Criteria®.* Suspected Physical Abuse—Child. Date of origin: 1984. Last review: 2016.
2. Campbell KA, Olson LM, and Keenan HT. Critical elements in the medical evaluation of suspected physical child abuse. *Pediatrics.* 2015;136(1):35-43. doi:10.1542/peds.2014-4192.
3. Christian CW, Crawford-Jakubiak JE, Flaherty EG et al. AAP Clinical Practice Guideline: the evaluation of suspected physical child abuse. *Pediatrics*. 2015;135(5):e1337-e1354. doi:10.1542/peds.2015-0356.
4. Henry MK, Wood JN. Advanced cervical spine imaging in abusive head trauma: an update on recent literature and future directions. *Acad pediatr.* 2018;18(7):733-735. doi:10.1016/j.acap.2018/05.008.
5. Society and College of Radiographers and The Royal College of Radiologists. *The radiological investigation of suspected physical abuse in children.* Revised 1st edition. London: The Royal College of Radiologists; 2018. https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr174_suspected_physical_abuse.pdf.
6. Henry MK, Bennett CE, Wood JN, Servaes S. Evaluation of the abdomen in the setting of suspected child abuse. *Pediatric radiology*. 2021;23:1-7.
7. Bennett CE, Christian CW. Clinical evaluation and management of children with suspected physical abuse. *Pediatric radiology*. 2021;51(6):853-60.
8. Karmazyn B, Marine MB, Wanner MR, et. al. Chest CT in the evaluation of child abuse - when is it useful? *Child Abuse Negl*. 2022;133:105823. doi:10.1016/j.chiabu.2022.105823.
9. Karmazyn B, Reher TA, Supakul N, et. al. Whole-spine MRI in children with suspected abusive head trauma. *AJR Am J Roentgenol*. 2022;218(6):1074-1087. doi:10.2214/AJR.21.26674.
10. Mankad K, Sidpra J, Mirsky DM, et. al. International consensus statement on the radiological screening of contact children in the context of suspected child physical abuse. *JAMA Pediatr*. 2023;177(5):526-533. doi:10.1001/jamapediatrics.2022.6184.

Infection/Osteomyelitis (PEDMS-8)

Guideline

Infection/Osteomyelitis (PEDMS-8)
References (PEDMS-8)

Infection/Osteomyelitis (PEDMS-8)

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- Infection and osteomyelitis imaging indications in pediatric individuals are similar to those for adult individuals other than the limping child.
  - See: **Infection/Osteomyelitis (MS-9)** in the Musculoskeletal Imaging Guidelines other than in the limping child.
  - See: **Limping Child with Suspected Infection (PEDMS-4.3)** for imaging guidelines when limping is present.
  - See: **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 indicated to evaluate for effusion or soft tissue fluid collection[6]
  - 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 indicated 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 bone scintigraphy with a labeled leukocyte scan enhances sensitivity. 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 particularly useful in cases with altered bone marrow distribution, such as joint prosthesis.

References (PEDMS-8)

v1.0.2024

1. Tuson CE, Hoffman EB, and Mann MD. Isotope bone scanning for acute osteomyelitis and septic arthritis in children. *J Bone Joint Surg.* 1994;76(2):306-310.
2. Lazzarini L, Mader JT, Calhoun JH. Osteomyelitis in long bones. *J Bone Joint Surg.* 2004;86-A(10):2305-2318. doi:10.2106/00004623-200410000-00028.
3. Robinette E, Shah SS. Osteomyelitis. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics*, Chapter 684. eds Kliegman RM, Stanton BF, St. Geme JW III, et al. 21st edition. Philadelphia, PA: Elsevier; 2020:3670-3676.
4. Funk SS, Copley LA. Acute hematogenous osteomyelitis in children: pathogenesis, diagnosis, and treatment. *Orthopedic Clinics*. 2017;48(2):199-208. doi:10.1016/j.ocl.2016.12.007.
5. Palestro CJ. Radionuclide imaging of osteomyelitis. *Semin Nucl Med*. 2015;45(1):32-46. doi:10.1053/j.semnuclmed.2014.07.005.
6. Shet NS, Iyer RS, et. al. *ACR Appropriateness Criteria®.* Osteomyelitis or Septic Arthritis-Child (Excluding Axial Skeleton). Date of origin: 2021. https://acsearch.acr.org/docs/ 3158175/Narrative/

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Foreign Body (PEDMS-9)

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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. See: **Foreign Body – General (MS-6.1)** for imaging guidelines.
- The common soft tissue foreign bodies in children are wood, glass, and metal slivers. The latter two elements are radiopaque and visible to some degree on plain radiographs, whereas wood is usually radiolucent and nearly always imperceptible on radiographs. When a radiolucent foreign body is suspected, ultrasound (CPT® 76881 or 76882) can be used to identify the foreign body.

Reference (PEDMS-9)

v1.0.2024

1. Nung RCH, Lee AWH. Ultrasonographic findings of suspected retained foreign body in soft tissue following penetrating injury. *Hong Kong J Radiol.* 2017;20:76-83. doi:10.12809/hkjr1715382.

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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)
References (PEDMS-10)

Inflammatory Musculoskeletal Disease (PEDMS-10.0)

MSP.MD.0010.0.A

v1.0.2024

- A pertinent clinical evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging.
- Inflammatory arthritis imaging indications in pediatric patients are very similar to those for adult individuals. See: **Rheumatoid Arthritis (RA) and Inflammatory Arthritis (MS-15)** in the Musculoskeletal Imaging Guidelines. Specific pediatric considerations are included below.

Juvenile Idiopathic Arthritis (PEDMS-10.1)

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- Ultrasound (CPT® 76881 or 76882) is indicated 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 for monitoring treatment or with planned treatment change may be approved
  - MRI of the most symptomatic joint without contrast or without and with contrast may be considered 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 indicated for evaluation of facet arthropathy in patients with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis.
- MRI TMJ (CPT® 70336) is indicated annually for detecting silent TMJ arthritis in children with juvenile idiopathic arthritis (JIA).
- MRI without or without and with of the most involved joint may be approved to evaluate involved or symptomatic joints in the following situations:[15]
  - 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) should NOT be considered for routine follow-up of treatment.

Chronic Recurrent Multifocal Osteomyelitis (PEDMS-10.2)

MSP.MD.0010.2.A
v1.0.2024

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).

- Individuals with CRMO can have the following imaging approved for evaluation of new or worsening pain, or response to treatment in patients 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.
- Literature[14] suggests MRI may have greater sensitivity for clinically occult lesions than bone scan. Whole-body MRI (CPT® 76498) can be approved for CRMO in the following situations.
  - WBMRI may be approved in an individual 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.
  - WBMRI may be approved 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.

Inflammatory Muscle Diseases (PEDMS-10.3)

MSP.MD.0010.3.A

v1.0.2024

- A pertinent clinical face-to-face evaluation including a detailed history, physical examination, and plain radiography 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 indicated in these disorders for the following purposes:

- Selection of biopsy site
- Clinical concern for progression
- Treatment monitoring
- Detection of occult malignancy

Juvenile Dermatomyositis:

- MRI without contrast can frequently confirm the diagnosis and thus avoid a biopsy.
- CT without contrast (CPT® 73700) is indicated to follow progressive calcification in muscles, but MRI (CPT® 73718) is often used instead since it permits assessment of the primary muscle disease as well.
  - Both CT and MRI are rarely indicated concurrently.
- Contrary to adult dermatomyositis, juvenile dermatomyositis is very rarely paraneoplastic in nature, and routine screening for occult neoplasm is not indicated.
  - CT Chest (CPT® 71260) and Abdomen and Pelvis (CPT® 74177) with contrast are indicated for individuals with palpable lymphadenopathy or hepatosplenomegaly.

References (PEDMS-10)

v1.0.2024

1. Chauvin NA, Doria AS. Ultrasound imaging of synovial inflammation in juvenile idiopathic arthritis *Pediatr Radiol.* 2017;47(9):1160-1170. doi:10.1007/s00247-017-3934-6.
2. Voit AM, Arnoldi AP, Douis H, et al. Whole-body magnetic resonance imaging in chronic recurrent multifocal osteomyelitis: clinical longterm assessment may underestimate activity. *J Rheumatol*. 2015;42:1357-1537. doi:10.3899/jrheum.141026.
3. Restrepo R, Lee EY, Babyn PS. Juvenile idiopathic arthritis current practical imaging assessment with emphasis on magnetic resonance imaging. *Radiol Clin N Am*. 2013;51(4):703-719. doi:10.1016/j.rcl.2013.03.003.
4. Wu EY, Rabinovich CE. Juvenile idiopathic arthritis. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:1260-1268.
5. Robinson AB, Reed AM. Juvenile dermatomyositis. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:1280-1284.
6. Ackigoz G, Averill LW. Chronic recurrent multifocal osteomyelitis: typical patterns of bone involvement in while-body bone scintigraphy. *Nucl Med Commun.* 2014;35(8):797-807. doi:10.1097/MNM.0000000000000126.
7. Stern SM, Ferguson PJ. Autoinflammatory Bone Diseases. *Rheum Dis Clin N Am*. 2013;39(4):735-749. doi:10.1016/j.rdc.2013.05.002.
8. Hedrich CM, Hofmann SR, Pablik J, et al. Autoinflammatory bone disorders with special focus on chronic recurrent multifocal osteomyelitis. *Pediatr Rheumatol Online J*. 2013;11:47. doi:10.1186/1546-0096-11-47.
9. Borzutzky A, Stern S, Reiff A et al. Pediatric chronic nonbacterial osteomyelitis. *Pediatrics.* 2012;130(5):e1190-e1197 doi: 10.1542/peds.2011-3788.
10. Khanna G, Sato TSP, Ferguson P. Imaging of chronic recurrent multifocal osteomyelitis. *RadioGraphics,* 2009;29(4):1159-1177. doi:10.1148/rg.294085244.
11. Feldman BM, Rider LG, Reed AM, et al. Juvenile dermatomyositis and other idiopathic inflammatory myopathies of childhood. *The Lancet*. 2008;371(9631):2201-12. doi:10.1016/S0140-6736(08)60955-1.
12. Morris P, Dare J. Juvenile dermatomyositis as a paraneoplastic phenomenon: an update. *J Pediatr Hematol Oncol*. 2010;32(3):189-191. doi:10.1097/MPH.0b013e3181bf29a2.
13. Colebatch-Bourn AN, Edwards CJ, Collado P, et. al. EULAR-PReS points to consider for the use of imaging in the diagnosis and management of juvenile idiopathic arthritis in clinical practice. *Annals of the rheumatic diseases*. 2015;74(11):1946-1957. doi:10.1136/annrheumdis-2015-207892.
14. Nico MAC, Araújo FF, Guimarães JB, et. al. Chronic nonbacterial osteomyelitis: the role of whole-body MRI. *Insights Imaging*. 2022;13(1):149. doi: 10.1186/s13244-022-01288-3.
15. Sudoł-Szopińska I, Herregods N, Doria AS, et. al. Advances in musculoskeletal imaging in juvenile idiopathic arthritis. *Biomedicines*. 2022;10(10):2417. doi:10.3390/biomedicines10102417.
16. Basra HA, Humphries PD. Juvenile idiopathic arthritis: what is the utility of ultrasound? *Br J Radiol*. 2017;90(1073):20160920. doi:10.1259/bjr.20160920.
17. Arnoldi AP, Schlett CL, Douis H, et. al. Whole-body MRI in patients with non-bacterial osteitis: radiological findings and correlation with clinical data. *Eur Radiol*. 2017;27(6):2391-9. doi:10.1007/s00330-016-4586-x.
18. Roderick MR, Sen ES, Ramanan AV. Chronic recurrent multifocal osteomyelitis in children and adults: current understanding and areas for development. *Rheumatology (Oxford)*. 2018;57(1):41-48. doi:10.1093/rheumatology/kex066.
19. Villani M, de Horatio LT, Garganese M, et. al.Whole-body MRI versus bone scintigraphy: which is the best diagnostic tool in patients with chronic recurrent multifocal osteomyelitis (CRMO)? *Pediatr Rheumatol*. 2015;13:P58. doi:10.1186/1546-0096-13-S1-P58.
20. Huber AM. Juvenile idiopathic inflammatory myopathies. *Pediatr Clin North Am*. 2018;65(4):739-56. doi:10.1016/j.pcl.2018.04.006.
21. Zhao Y, Ferguson PJ. Chronic nonbacterial osteomyelitis and chronic recurrent multifocal osteomyelitis in children. *Pediatric Clinics.* 2018;65(4):783-800. doi:10.1016/j.pcl.2018.04.003.
22. Rosendahl K, Maas M. Update on imaging in juvenile idiopathic arthritis. *Pediatr radiol.* 2018;48(6):783-784. doi:10.1007/s00247-017-4039-y.

23. Andronikou S, Kraft JK, Offiah AC, et. al. Whole-body MRI in the diagnosis of paediatric CNO/CRMO. *Rheumatology*. 2020;59(10):2671-80. doi: 10.1093/rheumatology/keaa303.
24. Roderick MR, Shah R, Rogers V, Finn A, Ramanan AV. Chronic recurrent multifocal osteomyelitis (CRMO)–advancing the diagnosis. *Pediatric Rheumatology*. 2016;14(1):1-5. doi:10.1186/s12969-016-0109-1.
25. Malattia C, Tzaribachev N, van den Berg JM, Magni-Manzoni S. Juvenile idiopathic arthritis-the role of imaging from a rheumatologist's perspective. *Pediatric radiology*. 2018;48(6):785-91. doi:10.1007/s00247-017-4014-7.
26. Malattia C, Tolend M, Mazzoni M, et. al. Current status of MR imaging of juvenile idiopathic arthritis. *Best Practice & Research Clinical Rheumatology*. 2020;3:101629. doi:10.1016/j.berh.2020.101629.

Muscle/Tendon Unit Injuries (PEDMS-11)

Guideline

Muscle/Tendon Unit Injuries (PEDMS-11)

Muscle/Tendon Unit Injuries (PEDMS-11)

MSP.MI.0011.A

v1.0.2024

- Muscle and tendon unit injury imaging indications in pediatric individuals are identical to those in the general imaging guidelines. See: **Muscle/Tendon Unit Injuries/ Diseases (MS-11)** in the Musculoskeletal Imaging Guidelines.

Osgood-Schlatter Disease (PEDMS-12)

Guideline

Osgood-Schlatter Disease (PEDMS-12)
References (PEDMS-12)

Osgood-Schlatter Disease (PEDMS-12)

MSP.OD.0012.A

v1.0.2024

- Osgood-Schlatter Disease is defined as traction apophysitis of the tibial tubercle in skeletally immature individuals. Diagnosis is by clinical examination and x-ray, and treatment is conservative.
- Advanced imaging is not indicated in this disorder.

References (PEDMS-12)

v1.0.2024

1. Alessi S, Depaoli R, Canepari M, et al. Baker's cysts in pediatric patients: ultrasonographic characteristics. *J Ultrasound.* 2012;15:76-81. doi:10.1016/j.jus.2011.06.007.
2. Sarkissian EJ, Lawrence JTR. Osgood-Schlatter Disease and Sinding-Larsen-Johansson Syndrome. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:3620-3621.
3. Griffin LY. *Essentials of Musculoskeletal Care.* 3rd edition. Rosemont, IL: American Academy of Orthopaedic Surgeons; 2005:713-714.
4. Kaneshiro NK. Osgood-Schlatter disease. Medline Plus. 10/11/2018. http://www.nlm.nih.gov/medlineplus/ency/article/001258.htm

Popliteal (Baker) Cyst (PEDMS-13)

Guideline

Popliteal (Baker) Cyst (PEDMS-13)
References (PEDMS-13)

Popliteal (Baker) Cyst (PEDMS-13)

MSP.PC.0013.A

v1.0.2024

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 appropriate initial imaging study.
- MRI without contrast (CPT® 73721) is indicated for preoperative planning or if ultrasound is non-diagnostic.

References (PEDMS-13)

v1.0.2024

1. Lawrence JTR. Popliteal cysts (baker cysts). In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:3618-3619.
2. Wheeless CR. Baker's cyst/popliteal cysts. Wheeless' Textbook of Orthopaedics. http://www.wheelessonline.com/ortho/bakers_cyst_popliteal_cysts.

Slipped Capital Femoral Epiphysis (SCFE) (PEDMS-14)

Guideline

Slipped Capital Femoral Epiphysis (SCFE) (PEDMS-14)
References (PEDMS-14)

Slipped Capital Femoral Epiphysis (SCFE) (PEDMS-14)

MSP.FE.0014.A

v1.0.2024

Slipped capital femoral epiphysis (SCFE) should be considered in young adolescents or preadolescents with groin, anterior thigh, or atraumatic knee pain. Symptoms often include a history of intermittent limp and pain for several weeks or months that are often poorly localized to the thigh, groin, or knee. Any obese adolescent or preadolescent presenting with a history of a limp and thigh, knee, or groin pain for several weeks to one month should be presumed to have a slipped capital femoral epiphysis (SCFE).

Imaging studies:

- Anteroposterior and lateral x-rays (frog leg or cross table lateral) of both hips will confirm or exclude the diagnosis.[8]
  - If clinical suspicion remains after negative plain films, MRI without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is indicated 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 reasonable 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 indicated for preoperative planning.

References (PEDMS-14)

v1.0.2024

1. Sankar WN, Winell JJ, Horn BD, Wells L. Slipped capital femoral epiphysis. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:3631-3632.
2. Kim YJ, Sierra RJ. Report of breakout session: slipped capital femoral epiphysis management 2011. *Clin Orthop Relat Res*. 2012;470(12):3464-3466. doi:10.1007/s11999-012-2587-x.
3. Gough-Palmer A, McHugh K. Investigating hip pain in a well child. *BMJ*. 2007;334:1216-1217. doi:10.1136/bmj.39188.515741.47.
4. Hesper T, Zilkens C, Bittersohl B, Krauspe R. Imaging modalities in patients with slipped capital femoral epiphysis. *J Child Orthop.* 2017;11:99-106. doi:10.1302/1863-2548-11-160276.
5. Jarrett DY, Matheney T, Kleinman PK. Imaging SCFE: diagnosis, treatment and complications. 2013. *Pediatr Radiol.* 2013;43:S71-S82. doi:10.1007/s00247-012-2577-x.
6. Peck D. Slipped capital femoral epiphysis: diagnosis and management. *Am Fam Physician*. 2017;95(12):779-84.
7. Sucato DJ. Approach to the Hip for SCFE: the North American perspective. *J Pediatr Orthop.* 2018;38:S5-12. doi:10.1097/BPO.0000000000001183.
8. Karout L, Naffaa L. Pediatric hip disorders: imaging guidelines and recommendations. *Radiol Clin North Am*. 2022;60(1):149-163. doi:10.1016/j.rcl.2021.08.007.

Limb Length Discrepancy (PEDMS-15)

Guideline

Limb Length Discrepancy (PEDMS-15)

Limb Length Discrepancy (PEDMS-15)

MSP.LL.0015.A

v1.0.2024

- Limb length discrepancy imaging indications in pediatric individuals are identical to those in the general imaging guidelines. See: **Limb Length Discrepancy (MS-17.1)** in the Musculoskeletal Imaging Guidelines.

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)
References (PEDMS-16)

Tarsal Coalition (Calcaneonavicular Bar/ Rigid Flat Foot) (PEDMS-16.1)

MPS.CD.0016.1.A

v1.0.2024

- Plain x-rays should be performed initially since the calcaneonavicular bar is readily visible in older children and adults.
  - Talocalcaneal coalition is more difficult to evaluate on plain x-rays.
- CT without contrast (CPT® 73700) or MRI without contrast (CPT® 73718) is indicated if tarsal coalition is suspected (because of restricted hindfoot motion on physical exam), and plain x-rays are inconclusive.

Club Foot (PEDMS-16.2)

MSP.CD.0016.2.A

v1.0.2024

Club Foot is a congenital foot contracture with foot in equinus (plantar flexion) and heel and forefoot in varus/adduction (turned in). 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 older children and adults.
- Ultrasound (CPT® 76881 or 76882) can be used to characterize the cartilaginous tarsal bones and demonstrate tarsal bone alignment in infants with non-ossified tarsal bones.
- MRI is not currently used to image clubfoot, and limited experiences are published in the literature. MRI (CPT® 73718) or CT (CPT® 73700) can be approved to determine residual deficits following repair.
  - Ultrasound is not required prior to MRI or CT if those studies are appropriate.

Vertical Talus (PEDMS-16.3)

MSP.CD.0016.3.A

v1.0.2024

- Congenital vertical talus (also known as congenital rocker-bottom foot) is a fixed foot deformity characterized by irreducible talonavicular dislocation. The talus is plantar flexed and does not articulate with the navicular bone.
- Plain x-rays should be performed initially since the anomaly is readily visible in older children and adults.
- MRI (CPT® 73718) or CT (CPT® 73700) to determine residual deficits following repair.

Femoral Anteversion and Tibial Torsion (PEDMS-16.4)

MSP.CD.0016.4.A

v1.0.2024

- 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) can be approved for preoperative evaluation[9].

References (PEDMS-16)

v1.0.2024

1. Miron M-C, Grimard G. Ultrasound evaluation of foot deformities in infants. *Pediatr Radiol.* 2016;46:193-209. doi:10.1007/s00247-015-3460-3.
2. Griffin LY. *Essentials of Musculoskeletal Care*. 3rd edition. Rosemont, IL: American Academy of Orthopaedic Surgeons; 2005:728-730.
3. Wise JN, Weissman BN, Appel M, et al. *ACR Appropriateness Criteria®*. Chronic foot pain. Date of origin: 1998. Last review date: 2020. https://acsearch.acr.org/docs/69424/Narrative.
4. Winell JJ, Davidson RS. Tarsal Coalition. In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. *Nelson Textbook of Pediatrics.* 21st edition. Philadelphia, PA: Elsevier; 2020:3601-3602,
5. Denning JR. Tarsal coalition in children. *Pediatric annals.* 2016;45(4):e139-43.
6. Winell JJ, Davidson RS. Talipes equinovarus (clubfoot). In: Kliegman RM, St. Geme JW III, Blum NJ, et. al., eds. Nelson Textbook of Pediatrics. 21st edition. Philadelphia, PA: Elsevier; 2020:3598-3599.
7. Machida J, Inaba Y, Nakamura N. Management of foot deformity in children. *J Orthop Sci.* 2017;22(2):175-83. doi:10.1016/j.jos.2016.12.009.
8. Hammer MR, Kanaan Y, Strouse PJ. Alignment disorders. In: Coley B, ed. *Caffey's Pediatric Diagnostic Imaging*. 13th edition. Philadelphia, PA: Elsevier Saunders; 2019:1296-1308.
9. Waelti S, Fischer T, Griessinger J, et. al. Ultra-low-dose computed tomography for torsion measurements of the lower extremities in children and adolescents. *Insights Imaging*. 2022;13(1):118. doi:10.1186/s13244-022-01257-w.

Policy History and Instructions for Use

Guideline

Policy History and Instructions for Use

Policy History and Instructions for Use

Policy History and Instructions for Use

v2.0.2024

Instructions for Use

This Medical Policy provides assistance in interpreting United HealthCare Services, Inc. standard benefit plans. When deciding coverage, the federal, state (Ohio Administrative Code [OAC]) or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state (OAC) or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state (OAC) or contractual requirements for benefit plan coverage govern.

Before using this policy, please check the federal, state (OAC) or contractual requirements for benefit plan coverage. United HealthCare Services, Inc reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

United HealthCare Services, Inc. uses InterQual® for the primary medical/surgical criteria, and the American Society of Addiction Medicine (ASAM) for substance use, in administering health benefits. If InterQual® does not have applicable criteria, United HealthCare Services, Inc. may also use United HealthCare Services, Inc. Medical Policies, Coverage Determination Guidelines, and/or Utilization Review Guidelines that have been approved by the Ohio Department for Medicaid Services. The United HealthCare Services, Inc. Medical Policies, Coverage Determination Guidelines, and Utilization Review Guidelines are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.

Policy History/Revision Information

Date	Summary of Changes
02/01/2024	Annual evidence-based updates
07/01/2024	Interim evidence-based updates