Cigna Medical Coverage Policies – Radiology
Pediatric Musculoskeletal Imaging Guidelines

Effective April 01, 2023

Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

These guidelines include procedures eviCore does not review for Cigna. Please refer to the Cigna CPT code list for the current list of high-tech imaging procedures that eviCore reviews for Cigna.

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General Guidelines (PEDMS-1.0)

Procedure Codes Associated With Musculoskeletal Imaging (PEDMS)

MSP.GG.ProcedureCodes.C
v1.0.2023

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
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Unlisted MRI procedure (for radiation planning or surgical software)	76498

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MRA Lower Extremity	73725

CT	CPT ®
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CT Upper Extremity without and with contrast	73202
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Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT ®
CTA Upper Extremity	73206
CTA Lower Extremity	73706

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
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Ultrasound, other soft tissue areas not otherwise specified	76999
Limited bilateral noninvasive physiologic studies of upper or lower	93922

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Ultrasound	CPT ®
extremity arteries	
Complete bilateral noninvasive physiologic studies of upper or lower extremity arteries	93923
Duplex scan of upper extremity arteries or arterial bypass grafts; complete bilateral	93930
Duplex scan of upper extremity arteries or arterial bypass grafts; unilateral or limited	93931
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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.

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Age Considerations (PEDMS-1.1)

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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.

Appropriate Clinical Evaluation and Conservative Treatment (PEDMS-1.2)

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

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Modality General Considerations (PEDMS-1.3)

MSP.GG.0001.3.C
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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 use as supported by these condition based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
      - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same imaging session.

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- 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.

- 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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Fracture and Dislocation (PEDMS-2)

Fracture and Dislocation (PEDMS-2)

MSP.FX.0002.0.A
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- A pertinent clinical evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging.

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Acute Fracture (PEDMS-2.1)

MSP.FX.0002.1.C
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- 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 sometime be indicated for complex fracture repairs. See: **3D Rendering (MS-3)** in the Musculoskeletal Imaging Guidelines.
- 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.

Joint 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.C
v1.0.2023

- These fractures can generally be diagnosed and managed adequately with plain x-ray.
- 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, 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.C
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- 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.

Background and Supporting Information

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.

Stress/Occult Fracture (PEDMS-2.5)

MSP.FX.0002.5.C
v1.0.2023

- 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
- 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
- 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
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- 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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Soft Tissue and Bone Masses (PEDMS-3)

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

MSP.ST.0003.1.A
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- 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 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 by ultrasound (CPT® 76881 or 76882) 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
v1.0.2023

- 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
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- 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
v1.0.2023

- 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.

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References (PEDMS-3)

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Limping Child (PEDMS-4)

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.

Limping Child with Suspected Trauma (PEDMS-4.2)

MSP.LC.0004.2.C
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- Plain radiographs are indicated. 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
- CT use is limited in the evaluation of the limping child with suspected trauma.

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Limping Child with Suspected Infection (PEDMS-4.3)

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- 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.
  - MRI without contrast or without and with contrast of the affected body area is indicated If plain radiography is not diagnostic and suspicion for infection remains high.

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

MSP.LC.0004.4.A
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- This differential diagnosis is quite broad.
  - Transient (or toxic) synovitis of the hip:
    - Ultrasound of the hip (CPT® 76881 or 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)**

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Developmental Dysplasia of the Hip (PEDMS-5)

Developmental Dysplasia of the Hip (PEDMS-5)

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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.
- Screening ultrasound (CPT® 76885 or CPT® 76886) is recommended for infants between 4 weeks of age and 4 months of age with one or more of the following risk factors:
    - Breech presentation
    - Family history of DDH
    - Abnormal hip exam (e.g. positive Ortolani or Barlow maneuvers, asymmetric thigh folds, shortening of the thigh observed on the dislocated side, limitation of hip abduction).
- For children between 4 and 6 months of age plain x-ray is the preferred imaging modality as femoral head ossification is often seen on x-ray in normal individuals
    - 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.
    - 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.

Background and Supporting Information

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.

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Avascular Necrosis (AVN) / Legg-Calvé-Perthes Disease / Idiopathic Osteonecrosis (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.
- 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[8].
    - If MRI is contraindicated or unavailable, the following study may be approved in lieu of MRI:
        - CT scan without contrast

Osteonecrosis (PEDMS-6.2)

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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.
- 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]

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Suspected Physical Child Abuse (PEDMS-7)

Suspected Physical Child Abuse (PEDMS-7)

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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.

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.
- 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.
- 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 abusive head trauma
    - CT Cervical Spine without contrast (CPT® 72125) and/or MRI Cervical Spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) 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.
- 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

- A skeletal survey, or other imaging, may be requested for siblings of abused children, or for other household members under the age of two due to the high incidence of occult fractures in these children. All such requests should be approved.

Background and Supporting Information

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.

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Infection/Osteomyelitis (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

References (PEDMS-8)

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Foreign Body (PEDMS-9)

Foreign Body (PEDMS-9)

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- Ultrasound (CPT® 76881 or CPT® 76882) to identify foreign body
- See: **Foreign Body – General (MS-6.1)** in the musculoskeletal Imaging Guidelines for additional imaging guidelines.

Background and Supporting Information

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,

Reference (PEDMS-9)

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Inflammatory Musculoskeletal Disease (PEDMS-10)

Inflammatory Musculoskeletal Disease (PEDMS-10.0)

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- 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 indicted 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
- MRI TMJ (CPT® 70336) is indicated annually for detecting silent TMJ arthritis in children with juvenile idiopathic arthritis (JIA).

Chronic Recurrent Multifocal Osteomyelitis (PEDMS-10.2)

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- Individuals with Chronic Recurrent Multifocal Osteomyelitis (CRMO) can have the following imaging for evaluation of new or worsening pain, or response to treatment in individuals without complete clinical resolution of pain symptoms, when plain x-rays are non-diagnostic:
  - MRI without contrast of specific painful body areas when plain x-ray and bone scan are insufficient to direct acute individual care decisions.
- Whole body MRI (CPT® 76498) 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.

Background and Supporting Information

- 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).
- Literature suggests MRI may have greater sensitivity for clinically occult lesions than bone scan.

Inflammatory Muscle Diseases (PEDMS-10.3)

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

Inflammatory Muscle Diseases :

These include 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.

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Muscle/Tendon Unit Injuries (PEDMS-11)

Muscle/Tendon Unit Injuries (PEDMS-11)

MSP.MI.0011.A
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- Muscle and tendon unit injury imaging indications in pediatric individuals are identical to those in the general imaging guidelines. See: **Muscle/Tendon Unit Injuries/Diseases (MS-11)** in the Musculoskeletal Imaging Guidelines.

Osgood-Schlatter Disease (PEDMS-12)

Osgood-Schlatter Disease (PEDMS-12)

MSP.OD.0012.A
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- 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.

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References (PEDMS-12)

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Popliteal (Baker) Cyst (PEDMS-13)

Popliteal (Baker) Cyst (PEDMS-13)

MSP.PC.0013.C
v1.0.2023

- 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.

Background and Supporting Information

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.

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References (PEDMS-13)

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

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

MSP.FE.0014.C
v1.0.2023

- Anteroposterior and lateral x-rays (frog leg or cross table lateral) of both hips will confirm or exclude the diagnosis.
    - If clinical suspicion remains after negative plain films, MRI without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is 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.
- MRI without contrast (CPT® 73721) is indicated for preoperative planning if MRI was not completed for diagnosis.

Background and Supporting Information

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).

References (PEDMS-14)

v1.0.2023

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Limb Length Discrepancy (PEDMS-15)

Limb Length Discrepancy (PEDMS-15)

MSP.LL.0015.A
v1.0.2023

- 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)

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

MPS.CD.0016.1.A
v1.0.2023

- 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.

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Club Foot (PEDMS-16.2)

MSP.CD.0016.2.C
v1.0.2023

- 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.

Background and Supporting Information

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.

Vertical Talus (PEDMS-16.3)

MSP.CD.0016.3.C
v1.0.2023

- 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.

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Femoral Anteversion and Tibial Torsion (PEDMS-16.4)

MSP.CD.0016.4.C
v1.0.2023

- 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.

Background and Supporting Information

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.

References (PEDMS-16)

v1.0.2023

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