CLINICAL GUIDELINES

Musculoskeletal Imaging Guidelines

Effective: May 15, 2025

VERSION 2.0.2025

EviCore
By EVERNORTH

EviCore healthcare Clinical Decision Support Tool Diagnostic Strategies: This tool addresses common symptoms and symptom complexes. Imaging requests for individuals with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician, specialist, and/or individual's Primary Care Physician (PCP) may provide additional insight.

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General Guidelines (MS-1)

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Procedure Codes Associated with Musculoskeletal Imaging (MS)

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MRI/MRA	CPT®
MRI Upper Extremity, other than joint, without contrast	73218
MRI Upper Extremity, other than joint, with contrast	73219
MRI Upper Extremity, other than joint, without and with contrast	73220
MRI Upper Extremity, any joint, without contrast	73221
MRI Upper Extremity, any joint, with contrast	73222
MRI Upper Extremity, any joint, without and with contrast	73223
MR Angiography Upper Extremity without or with contrast	73225
MRI Lower Extremity, other than joint, without contrast	73718
MRI Lower Extremity, other than joint, with contrast	73719
MRI Lower Extremity, other than joint, without and with contrast	73720
MRI Lower Extremity, any joint, without contrast	73721
MRI Lower Extremity, any joint, with contrast	73722
MRI Lower Extremity, any joint, without and with contrast	73723
MR Angiography Lower Extremity without or with contrast	73725
MRI Pelvis without contrast	72195
MRI Pelvis with contrast	72196

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MRI/MRA	CPT®
MRI Pelvis without and with contrast	72197

CT/CTA	CPT®
CT Upper Extremity without contrast	73200
CT Upper Extremity with contrast	73201
CT Upper Extremity without and with contrast	73202
CT Angiography Upper Extremity without and with contrast	73206
CT Lower Extremity without contrast	73700
CT Lower Extremity with contrast	73701
CT Lower Extremity without and with contrast	73702
CT Angiography Lower Extremity without and with contrast	73706
CT Pelvis without contrast	72192
CT Pelvis with contrast	72193
CT Pelvis without and with contrast	72194
Bone Mineral Density CT, one or more sites, axial skeleton	77078

Ultrasound	CPT®
Ultrasound, complete joint (ie, joint space and peri-articular soft tissue structures) real-time with image documentation	76881
Ultrasound, limited, joint or other nonvascular extremity structure(s) (e.g., joint space, peri-articular tendon[s], muscle[s], nerve[s], other soft tissue structure[s], or soft tissue mass[es]), real-time with image documentation	76882

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Ultrasound	CPT®
Ultrasound, pelvic (nonobstetric), real time with image documentation	76857

Nuclear Medicine	CPT®
Bone Marrow Imaging, Limited	78102
Bone Marrow Imaging, Multiple	78103
Bone Marrow Imaging, Whole Body	78104
Bone or Joint Imaging Limited	78300
Bone or Joint Imaging Multiple	78305
Bone Scan Whole Body	78306
Bone Scan 3 Phase Study	78315
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (e.g., head, neck, chest, pelvis), single day imaging	78800
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days	78801
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging	78802
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (e.g., head, neck, chest, pelvis), single day imaging	78803

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, single area (e.g., head, neck, chest, pelvis), single day imaging	78830
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78831
Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (e.g., pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days	78832

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General Guidelines (MS-1.0)

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- Before advanced diagnostic imaging can be considered, there must be an in-person clinical evaluation as well as a clinical re-evaluation after a trial of failed conservative treatment; the clinical re-evaluation may consist of an in-person evaluation or other meaningful contact with the provider's office such as email, web, telephone communications, or clinical documentation from a provider.
- An in-person clinical evaluation for the current episode of the condition is required to have been performed before advanced imaging can be considered. This may have been either the initial clinical evaluation or the clinical re-evaluation.
- The in-person clinical evaluation should include a relevant history and physical examination, appropriate laboratory studies, and non-advanced imaging modalities. Other forms of meaningful contact (e.g., telephone call, electronic mail, telemedicine, or messaging) are not acceptable as an in-person evaluation.
- Prior to advanced imaging consideration, the results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study for all musculoskeletal conditions, unless otherwise noted in the guidelines.
    - Initial plain x-ray can rule out those situations that do not often require advanced imaging, such as osteoarthritis, acute/healing fracture, dislocation, osteomyelitis, acquired/congenital deformities, and tumors of bone amenable to biopsy or radiation therapy (in known metastatic disease), etc.
    - X-ray may provide complementary clinical information regarding detailed bony anatomy, and may assist with preoperative planning when surgery is being contemplated.
    - X-ray may provide clinically significant details for soft tissue masses, such as soft tissue calcification, presence or absence of phleboliths, radiographic density, and effect on adjacent bone.
    - X-ray often has a larger field of view than MRI or CT and has the potential to identify more proximal or distal pathology in an extremity.
- Clinical re-evaluation is required prior to consideration of advanced diagnostic imaging to document failure of significant clinical improvement following a recent (within 12 weeks) six week trial of provider-directed conservative treatment. Clinical re-evaluation can include documentation of an in-person encounter with a provider or documentation of other meaningful contact with a provider’s office by the individual (e.g. telephone call, electronic mail, telemedicine, or messaging).
- Provider-directed conservative treatment may include rest, ice, compression, and elevation (R.I.C.E.), non-steroidal anti-inflammatories (NSAIDs), narcotic

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and non-narcotic analgesic medications, oral or injectable corticosteroids, viscosupplementation injections, a provider-directed home exercise program, cross-training, and/or physical/occupational therapy or immobilization by splinting/casting/bracing.

- Orthopedic specialist evaluation can be helpful in determining the need for advanced imaging.
  - The need for repeat advanced imaging should be carefully considered and may not be indicated if prior imaging has been performed.
  - Serial advanced imaging, whether CT or MRI, for surveillance of healing or recovery from musculoskeletal disease is not supported by the medical evidence in the majority of musculoskeletal conditions.

Evidence Discussion (MS-1)

For most patients with a musculoskeletal complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs.

X-rays can determine whether an advanced diagnostic imaging study is actually needed, what specific advanced diagnostic imaging study is warranted and if contrast is needed. X-rays often have a larger field-of-view than an MRI or CT and have the potential to identify more proximal or distal pathology in an extremity that could ultimately assist in determining the patient's diagnosis. Advanced imaging results are better interpreted when compared to plain x-rays, which provide complementary clinical information regarding detailed bony anatomy and may assist with pre-operative planning when surgery is being contemplated. Taljanovic, et al. concluded when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs. Initial plain x-rays (prior to obtaining advanced imaging) for musculoskeletal conditions are also recommended by the American College of Radiology Appropriate Use Criteria.

Advanced imaging is typically not necessary for the initial evaluation for patients with a musculoskeletal complaint. Treatment for many musculoskeletal conditions does not rely on advanced imaging results and most patients will improve within a few weeks or months with conservative care. Advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. It has been reported that approximately 30 – 40 percent of middle-aged patients and an even higher percentage of older patients have asymptomatic meniscus, rotator cuff and superior labral tears. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Additional risks to the patient associated with advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

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In general, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Imaging Techniques (MS-2)

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Plain X-Ray (MS-2.1)

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- The results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider of the advanced imaging study for all musculoskeletal conditions, unless otherwise noted in the guidelines, to rule out those situations that do not often require advanced imaging, such as: osteoarthritis, acute/healing fracture, dislocation, osteomyelitis, acquired/congenital deformities, and tumors of bone amenable to biopsy or radiation therapy (in known metastatic disease), etc.

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MRI or CT (MS-2.2)

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- Magnetic Resonance Imaging (MRI) is often the preferred advanced imaging modality in musculoskeletal conditions because 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)].
- Computed Tomography (CT) is preferred for imaging cortical bone anatomy; thus, it is useful for studying complex fractures (particularly of the joints), dislocations, and assessing delayed union or non-union of fractures, if plain X-rays are equivocal. CT may be the procedure of choice in individuals who cannot undergo an MRI, such as those with pacemakers.

Positional MRI

- Positional MRI is also referred to as dynamic, standing, weight-bearing, or kinetic MRI. Currently, there is inadequate scientific evidence to support the medical necessity of this study. As such, it should be considered not medically necessary.

Positional CT

- Positional CT, also referred to as weight-bearing or cone beam CT, may be useful in imaging of the foot and ankle.
  - If a request for foot or ankle imaging with positional CT meets medical necessity criteria for standard CT imaging (as defined in the condition-specific guidelines), the request may be approved.
    - Positional CT of anatomic areas other than the foot and ankle are considered not medically necessary.

dGEMRIC Evaluation of Cartilage

- Delayed gadolinium enhanced Magnetic Resonance Imaging of Cartilage (dGEMRIC) is a technique where an MRI estimates joint cartilage glycosaminoglycan content after penetration of the contrast agent in order to detect cartilage breakdown. Currently, there is inadequate scientific evidence to support the medical necessity of this study. As such, it should be considered not medically necessary for the diagnosis and surveillance of, or preoperative planning related to chondral pathology.

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Ultrasound (MS-2.3)

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- Ultrasound (US) uses sound waves to produce images that can be used to evaluate a variety of musculoskeletal disorders. As with US in general, musculoskeletal US is highly operator-dependent, and proper training and experience are required to perform consistent, high-quality evaluations.

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Contrast Issues (MS-2.4)

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- Most musculoskeletal imaging (MRI or CT) is without contrast; however, the following examples may be considered with contrast:
  - Tumors, osteomyelitis, and soft tissue infection (without and with contrast)
  - MRI arthrography (with contrast only)
  - MRI for rheumatoid arthritis and inflammatory arthritis (contrast as requested)
  - For individuals with a contrast contraindication, if the advanced imaging recommendation specifically includes contrast, the corresponding advanced imaging study without contrast may be approved as an alternative, although the non-contrast study may not provide an adequate evaluation of the condition of concern.

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Positron Emission Tomography (PET/CT) (MS-2.5)

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- PET/CT is a nuclear medicine/computed tomography (CT) fusion study that uses a positron emitting radiotracer to create cross-sectional and volumetric images based on tissue metabolism. PET imaging fusion with CT allows for better anatomic localization of the areas of abnormal increased tissue activity seen on PET.
- PET/CT is indicated for imaging of certain musculoskeletal conditions when MRI or CT is equivocal or cannot be performed. See: **Nuclear Medicine (MS-28)** for specific indications.
    - At this time, FDG is the only indicated radiotracer for use with PET/CT in the imaging of musculoskeletal conditions.

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Nuclear Medicine (MS-2.6)

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- A bone scan is a nuclear medicine imaging study in which an amount of radioactive material is injected and images are obtained at different time intervals, depending on the condition. A bone scan is done to reveal problems with bone metabolism. Areas where bone cells are repairing themselves show the most activity. It can help diagnose a number of bone conditions, including cancer of the bone or metastasis, location of bone inflammation, fracture, and bone infection.
- Nuclear Medicine WBC Scan is performed using radioactive material which is tagged to the white blood cells. When injected into the body, the material attaches to sites of inflammation/infection. Once distributed in these areas, the sites of suspected infection/inflammation can be seen on nuclear imaging equipment. These can be imaged as a planar study, SPECT study, or SPECT/CT study.
- Bone Marrow Imaging is used in combination with a WBC Scan to help differentiate between true infection and physiological marrow uptake. The bone marrow scan provides a map of the normal physiological white cell uptake that is then compared to the white blood cell scan. Any discordance in white cell uptake (e.g., more WBC uptake than marrow uptake) between the two studies indicates a focus of infection.
- See: **Nuclear Medicine (MS-28)** and condition-specific guidelines for specific indications.

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Evidence Discussion (MS-2)

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MRI is an excellent advanced imaging modality for musculoskeletal conditions. It is highly sensitive and specific for evaluation of soft tissue secondary to its superior soft tissue contrast resolution. It is highly sensitive for detection of occult fractures. MRI also carries the benefit of no ionizing radiation exposure. MRI is limited by its longer acquisition times, limited availability, distortion artifacts and incompatibility with some implantable devices and metallic objects. There is lack of high level evidence to support positional MRI.

Currently, there is inadequate high level scientific evidence to support the medical necessity of delayed gadolinium enhanced Magnetic Resonance Imaging of Cartilage (dGEMRIC). As such, it should be considered not medically necessary for the diagnosis and surveillance of, or preoperative planning related to chondral pathology.

CT is preferred for the evaluation of cortical bone anatomy. CT has the advantage of being widely available, especially in acute care settings. CT does carry the risk of ionizing radiation and it is estimated that 2% of all cancers in the United States may be attributable to radiation exposure from CT scans. Positional CT has been shown to be useful in the evaluation of foot and ankle conditions, however, there is there is insufficient evidence to support the use of positional CT for other anatomic areas.

FDG-PET/CT scan is highly sensitive (81-100%) and specific (87-100%) for the detection of osteomyelitis. However, FDG is the only indicated radiotracer for use with PET/CT in the imaging of musculoskeletal conditions.

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3D Rendering (MS-3)

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3D Rendering (MS-3)

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- Indications for musculoskeletal 3-D image post-processing for preoperative planning when conventional imaging is insufficient for:
  - Complex fractures (comminuted or displaced)/dislocations of any joint.
  - Spine fractures, pelvic/acetabulum fractures, intra-articular fractures.
  - Preoperative planning for other complex surgical cases.
- The code assignment for 3-D rendering depends upon whether the 3-D post-processing is performed on the scanner workstation (CPT® 76376) or on an independent workstation (CPT® 76377).
  - 2-D reconstruction (i.e. reformatting axial images into the coronal plane) is considered part of the tomography procedure, is not separately reportable, and does not meet the definition of 3-D rendering.
  - It is not indicated to report 3-D rendering in conjunction with CTA and MRA because those procedure codes already include the post-processing.
  - In addition to the term "3-D," the following terms may also be used to describe 3-D post-processing:
    - Maximum intensity projection (MIP)
    - Shaded surface rendering
    - Volume rendering
- Additionally - If multiple CPT codes are performed for the same indication on the same day, one 3D rendering code is required. If they are performed on separate days, 3D rendering codes are required for each study on each day.
- The 3-D rendering codes require concurrent supervision of image post-processing 3-D manipulation of volumetric data set and image rendering.

Evidence Discussion (MS-3)

3D CT improves both the reliability and the accuracy of radiographic characterization of articular fractures of the distal radius and influences treatment decisions, compared to 2D imaging alone. 3D reconstructions can be particularly helpful in preoperative planning for complex articular injuries. The addition of 3D reconstructions to standard 2D CT images has been shown to change operative management in up to 48% of intra-articular distal radius fractures.

In the evaluation of traumatic elbow injuries, 3D CT reconstruction of coronoid and olecranon fractures can identify specific shapes, sizes, and orientations of fracture fragments associated with various patterns of traumatic elbow instability which can impact surgical treatment planning.

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In shoulder trauma, 3D CT images may better characterize fracture patterns and humeral neck angulation, which can affect functional outcomes. 3D CT images can better visualize scapula fracture displacement and angulation.

Pelvic and acetabular fractures can be difficult to appreciate on routine radiographs. Complex injuries and subtle fractures, especially in the axial plane, can be better demonstrated on 3D CT images.

For the assessment of postoperative alignment in trauma patients with ankle pilon fractures, studies have found 3D reconstruction with MRI to be comparable to that of 3D CT reconstructions. Evaluations of complex trauma, articular surfaces, and osseous alignment are potential indications in ankle imaging that may benefit from 3D reconstruction.

In a study of 35 patients with multiple rib fractures requiring surgical stabilization, imaging with 3D CT in addition to 2D CT and plain radiography changed the surgical plan in 65.7% of the cases, compared to imaging with plain radiography and 2D CT alone.

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Avascular Necrosis (AVN)/ Osteonecrosis (MS-4)

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AVN (MS-4.1)

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- MRI without contrast, MRI without and with contrast, or CT without contrast of the area of interest can be performed when plain x-ray findings are negative or equivocal and clinical symptoms warrant further investigation for suspected avascular necrosis.
- Advanced imaging for AVN confirmed by plain x-ray is appropriate for treatment planning in the following situations:
    - Femoral head:
        - MRI Hip without contrast (CPT® 73721) or CT Hip without contrast (CPT® 73700)
    - Distal Femur:
        - MRI Knee without contrast (CPT® 73721) or CT Knee without contrast (CPT® 73700)
    - Talus:
        - MRI Ankle without contrast (CPT® 73721) or CT Ankle without contrast (CPT® 73700)
    - Tarsal navicular (Kohler Disease):
        - MRI Foot without contrast (CPT® 73718) or CT Foot without contrast (CPT® 73700)
    - Metatarsal head (Frieberg's Infraction):
        - MRI Foot without contrast (CPT® 73718) or CT Foot without contrast (CPT® 73700)
    - Humeral head:
        - MRI Shoulder without contrast (CPT® 73221) or CT Shoulder without contrast (CPT® 73200)
    - Lunate (Kienbock's Disease)/Scaphoid (Preiser's Disease):
        - CT Wrist without contrast (CPT® 73200) or MRI Wrist without contrast (CPT® 73221)
- Individuals with acute lymphoblastic leukemia and known or suspected osteonecrosis should be imaged according to guidelines in **Acute Lymphoblastic Leukemia (PEDONC-3.2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- Known or suspected osteonecrosis in long-term cancer survivors should be imaged according to guidelines in **Osteonecrosis in Long Term Cancer Survivors (PEDONC-19.4)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

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Background and Supporting Information

- Classification systems use a combination of plain x-rays, MRI, and clinical features to stage avascular necrosis.

Evidence Discussion (MS-4)

Multiple articles report that obtaining plain radiographs is fundamental in the work-up and follow-up of patients presenting with symptoms suspicious for osteonecrosis/avascular necrosis (AVN). The American College of Radiology Appropriateness Criteria for Osteonecrosis (revised 2022) also supports radiography as the initial imaging study for clinically suspected osteonecrosis. Also noted was that although radiographs are less sensitive for detection of early osteonecrosis, they help to exclude other causes of extremity pain such as fracture, primary arthritis, or tumor. In late stage osteonecrosis, x-rays will also show findings of secondary osteoarthritis.

Plain x-rays are also valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

The literature and the American College of Radiology Appropriateness Criteria for Osteonecrosis (revised 2022) support advanced imaging when initial x-rays are negative or equivocal and osteonecrosis is still suspected. MRI has been shown to be the most sensitive and specific imaging modality for the diagnosis of osteonecrosis, with a sensitivity and specificity nearing 100%. Advanced imaging for AVN is also supported for treatment planning when AVN is confirmed by plain x-ray.

It should be noted, however, that advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Ganguli et. al. reported incidental findings on screening and diagnostic tests are common and may trigger cascades of further testing and treatment. Also reported was that such cascades of care come with substantial potential for harm (including patient anxiety and additional treatment risks) in addition to monetary costs and inconvenience. Risks of advanced imaging also include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

Although the use of any coverage criteria includes the possible risk of delayed care, EviCore firmly believes the benefits of our evidence based criteria best ensure patient safety and highly outweigh any clinical harm from perhaps briefly delaying advanced imaging if needed.

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Fractures (MS-5)

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Acute Fracture (MS-5.1)

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- CT or MRI without contrast if **ANY** of the following:
  - Complex (comminuted or displaced) fracture with or without dislocation on plain x-ray.
    - CT is preferred unless it is associated with neoplastic disease when MRI without/with contrast is preferred unless MRI contraindicated.
  - Individual presents initially to the requesting provider with a documented history of an acute traumatic event at least two weeks prior with a negative plain x-ray at the time of this face-to-face encounter and a clinical suspicion for an occult/stress/ insufficiency fracture see: **Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints (MS-5.2)**.
- For osteochondral fracture or osteochondral injury, see: **Chondral/Osteochondral Lesions, Including Osteochondritis Dissecans and Fractures (MS-13.1)**

Suspected Occult/Stress/Insufficiency Fracture/Stress Reaction and Shin Splints (MS-5.2)

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This section does not include indications for periprosthetic fractures. See **Post-Operative Joint Replacement Surgery – General (MS-16.1)**, **Nuclear Medicine (MS-28)**, and anatomical area tables for individual joints.

- MRI without contrast can be performed for suspected hip/femoral neck, tibia, pelvis/sacrum, tarsal navicular, proximal fifth metatarsal, or scaphoid occult/stress/insufficiency fractures, and suspected atypical femoral shaft fractures related to bisphosphonate use if the initial evaluation of history, physical exam and plain x-ray fails to establish a definitive diagnosis.
  - CT without contrast can be performed as an alternative to MRI for suspected occult/insufficiency fractures of the pelvis/hip and suspected atypical femoral shaft fractures related to bisphosphonate see: **Pelvis (MS-23)** and **Hip (MS-24)**, and suspected occult fractures of the scaphoid see: **Wrist (MS-21)**.
  - For suspected fractures, when MRI cannot be performed, see **Nuclear Medicine (MS-28)**
- MRI or CT without contrast can be performed for all other suspected occult/stress/insufficiency fractures with either of the following:
  - Repeat plain x-rays remain non-diagnostic for fracture after a minimum of 10 days of provider-directed conservative treatment **OR**
  - Initial plain x-rays obtained a minimum of 14 days after the onset of symptoms are non-diagnostic for fracture
  - For suspected fractures, when MRI cannot be performed, see **Nuclear Medicine (MS-28)**
- MRI of the lower leg without contrast (CPT® 73718) for suspected shin splints when **BOTH** of the following are met:
  - Initial plain x-ray **AND**
  - Failure of a 6-week trial of provider-directed conservative treatment
- For stress reaction, advanced imaging is not medically necessary for surveillance or “return to play” decisions regarding a stress reaction identified on an initial imaging study.

Musculoskeletal Imaging Guidelines

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- MRI without contrast of the area of interest for stress fracture follow-up imaging for "return to play" evaluation at least 3 months after the initial imaging study for stress fracture.
- For periprosthetic fractures related to joint replacement see: **Post-Operative Joint Replacement Surgery (MS-16.1)**, **Shoulder (MS-19)**, **Elbow (MS-20)**, **Hip (MS-24)**, **Knee (MS-25)**, and **Ankle (MS-26)**.

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Other Indications (MS-5.3)

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- CT or MRI without contrast after recent (within 30 days) plain x-ray if **ONE** of the following is present:
  - Concern for delayed union or non-union of fracture, osteotomy, or joint fusions.
  - Part of preoperative evaluation for a planned surgery of a complex fracture with or without dislocation.

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Evidence Discussion (MS-5)

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The vast majority of acute fractures can be easily diagnosed via plain radiography. Therefore, it is widely accepted that the initial imaging for a patient with a suspected fracture should be plain radiographs. For patients noted to have a complex fracture (comminuted or displaced) on initial plain radiographs, CT can provide detailed bony information to allow further evaluation and treatment planning.

Initial imaging for a suspected stress fracture should begin with plain radiographs. Although initial x-rays may not identify the fracture, repeat x-ray imaging in 10 – 14 days is supported by the American College of Radiology Appropriateness Criteria for Stress (Fatigue-Insufficiency) Fracture Including Sacrum Excluding Other Vertebrae (revised 2024). Repeat radiographs may show osseous reaction confirming the presence of an occult or stress fracture. However, if repeat x-rays remain negative and there is still suspicion of an occult or stress fracture, MRI is recommended as it has been shown to be the most sensitive and specific imaging modality for workup of suspected stress injuries. CT, Bone scan, SPECT and SPECT/CT are also considered as options per American College of Radiology Appropriateness Criteria for Stress (Fatigue-Insufficiency) Fracture Including Sacrum Excluding Other Vertebrae (revised 2024).

There exists a subset of occult/stress/insufficiency fractures that have an increased risk of fracture progression, delayed healing, non-union and avascular necrosis. For these high risk injuries, advanced imaging is recommended if initial x-rays are negative or indeterminate as these injuries require early diagnosis and immediate treatment.

The evaluation of patients with suspected shin splints/medial tibial stress syndrome includes a detailed history, physical examination and plain x-rays. Most patients will improve with conservative care, however, MRI is recommended if the patient fails to respond to an adequate trial of conservative treatment.

For the assessment of bony healing, serial x-ray imaging is usually sufficient. However, if there are still concerns for delayed union or non-union, CT scanning can provide detail as to the presence or absence of bridging callus. MRI can also assist in the evaluation of bone healing.

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Foreign Body (MS-6)

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Foreign Body – General (MS-6.1)

MS.FB.0006.1.A
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- Ultrasound (CPT® 76881 or CPT® 76882) or CT without contrast or MRI without and with contrast or MRI without contrast of the area of interest can be approved after plain x-rays rule out the presence of radiopaque foreign bodies.
  - Ultrasound (CPT® 76881 or CPT® 76882) is the preferred imaging modality for radiolucent (non-radiopaque) foreign bodies (e.g. wood, plastic)
  - CT without contrast is recommended when plain x-rays are negative and a radiopaque foreign body is still suspected, as CT is favored over MRI for the identification of foreign bodies
  - MRI without and with contrast is an alternative to US and CT for assessing the extent of infection associated with a suspected foreign body

Evidence Discussion (MS-6.1)

- X-ray is a good initial screening examination in suspected foreign bodies of the musculoskeletal system. X-rays provide an excellent overview of the anatomic area of interest.
- X-rays have 98% sensitivity in the evaluation of radiopaque foreign bodies. Metallic foreign bodies are radiopaque and are readily detectable by x-ray.
- If a foreign body is not visualized on x-rays, Ultrasound can be performed for further evaluation. Ultrasound has high sensitivity and specificity in detecting radiolucent objects like wood, and plastic. Ultrasound is also widely available, accessible and does not involve ionized radiation. Ultrasound can also help to evaluate complications of foreign body such as infections and vascular or tendon injuries.
- CT is useful when X-rays are negative but a radiopaque foreign body is still suspected. MRI is better than CT in the assessment of infection associated with a foreign body.

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Musculoskeletal Imaging Guidelines

Ganglion Cysts (MS-7)

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Ganglion Cysts – General (MS-7.1)

MS.GC.0007.1.A
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- Plain x-ray is the initial imaging study for ganglion cysts.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- MRI without contrast or MRI without and with contrast or US (CPT® 76881 or CPT® 76882) is appropriate for surgical planning.
- Advanced imaging is not indicated for ganglions that can be diagnosed by history and physical examination.

Evidence Discussion (MS-7.1)

The most appropriate initial imaging test for ganglion is an x-ray. Some conditions need additional imaging tests for diagnosis or to plan for treatment, when x-rays are normal or equivocal. When there is a cystic mass for which surgery is being considered, Ultrasound or MRI can be considered. Ultrasound is often sufficient for evaluating typical cysts and MRI is useful for preoperative purposes, for cysts with atypical features or when neurologic symptoms are present. High resolution MRI was also found to be diagnostic for occult dorsal wrist ganglion.

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Gout/Calcium Pyrophosphate Deposition Disease (CPPD)/ Pseudogout/ Chondrocalcinosis (MS-8)

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Gout – General (MS-8.1)

MS.GD.0008.1.A

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- CT without contrast, MRI without contrast, or MRI without and with contrast of the area of interest is indicated when **BOTH** of the following are met:
  - Initial plain x-ray to rule out other potential disease processes
  - Infection or neoplasm is in the differential diagnosis for soft-tissue tophi

Background and Supporting Information

- Early stages of gout can be diagnosed clinically since radiographic findings are not present early in the disease course.

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CPPD (Pseudogout/Chondrocalcinosis) – General (MS-8.2)

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- Calcium pyrophosphate deposition disease (CPPD), also called pseudogout, can often be diagnosed from plain x-rays; advanced diagnostic imaging is generally not medically necessary.

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Evidence Discussion (MS-8)

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The American College of Radiology (ACR) Appropriateness Criteria for Chronic Extremity Joint Pain-Suspected Inflammatory Arthritis, Crystalline Arthritis, or Erosive Osteoarthritis (revised 2022) recommends plain radiography as the initial imaging study for chronic extremity joint pain where crystalline arthritis is suspected. X-rays may contain sufficient findings for the diagnosis of gout or calcium pyrophosphate deposition disease (CPPD). Plain x-rays may also rule out or rule in alternative causes of pain such as arthritis, infection or trauma.

Advanced imaging is typically not required for the evaluation of patients with suspected crystalline arthropathy, as a definitive diagnosis can be made based on the presence of monosodium urate crystals or calcium pyrophosphate crystals on synovial fluid microscopy. However, advanced imaging can be helpful in the evaluation of tophi when neoplasm or infection are included in the differential diagnosis.

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Musculoskeletal Imaging Guidelines

Infection/ Osteomyelitis (MS-9)

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Infection – General (MS-9.1)

MS.OI.0009.1.A

v2.0.2025

- MRI without contrast, MRI without and with contrast, CT without contrast, CT with contrast, or Ultrasound (CPT® 76881 or 76882) of the affected area is appropriate after plain x-ray(s) in the following scenarios:
  - Plain x-ray(s) do not demonstrate infection, **AND**
  - Plain x-ray(s) do not suggest alternative diagnoses such as neuropathic arthropathy or fracture, **AND**
  - Soft tissue or bone infection (osteomyelitis) is suspected **OR**
  - Plain x-ray(s) are positive for infection, **AND**
  - The extent of infection into the soft tissues and any skip lesions require evaluation
- Individuals with suspected spinal infections
  - See: **Red Flag Indications (SP-1.2)** for advanced imaging guidelines
- Individuals with diabetic foot infections after plain x-ray(s)
  - See: **Foot (MS-27)** for advanced imaging guidelines
- For nuclear medicine studies appropriate in specific scenarios, see: **Nuclear Medicine (MS-28)**

Musculoskeletal Imaging Guidelines

Septic Joint (MS-9.2)

MS.OI.0009.2.A
v2.0.2025

- MRI without and with contrast, MRI without contrast, CT without contrast, CT with contrast, or Ultrasound (CPT® 76881 or CPT® 76882) of the affected joint is appropriate when standard or image-guided arthrocentesis is contraindicated, unsuccessful, or non-diagnostic, and the clinical documentation satisfies ALL of the following criteria:
  - History and physical examination findings [One of the following]:
    - Development of an acutely hot and swollen joint (< 2 weeks)
    - Decreased range of motion due to pain
    - Documented fever
  - Laboratory tests [One of the following]:
    - Leukocytosis
    - Elevated ESR or C-reactive protein
    - Analysis of the joint fluid is non-diagnostic
  - Plain x-ray of the joint
    - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- MRI without and with contrast, MRI without contrast, CT without contrast, or CT with contrast of the affected joint is appropriate after plain x-rays if the arthrocentesis is diagnostic and if there is a confirmed septic joint, to evaluate the extent of infection into the soft tissues and any skip lesions that would require evaluation.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider

Background and Supporting Information

- Analysis of joint fluid is most often sufficient to diagnose a septic joint.

Evidence Discussion (MS-9)

v2.0.2025

Radiographs should be used for the initial evaluation of musculoskeletal infections, including osteomyelitis, septic arthritis, and soft tissue infection. Obtaining the initial radiograph provides an excellent overview of the anatomic area of interest and can exclude fractures and tumors as the cause of swelling or pain.

Radiographs also help with the interpretation of future imaging studies such as CT, MRI, ultrasound (US), and nuclear medicine scans.

The clinical presentation of a hot swollen joint is common and has wide differential diagnosis. Septic arthritis is traditionally a clinical diagnosis based on physical examination and prompt arthrocentesis.

In many cases, imaging cannot distinguish infected from non-infected joints or fluid collections, and aspiration and culture are needed for diagnosis.

US, MRI, or CT is usually appropriate as the next imaging study for suspected septic arthritis, soft tissue infection, or osteomyelitis following normal radiographs. They may also be helpful to evaluate the adjacent soft tissues for infection. These procedures are equivalent alternatives (i.e., only one procedure will be ordered to provide the clinical information to effectively manage the patient's care).

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Soft Tissue Mass or Lesion of Bone (MS-10)

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Soft Tissue Mass (MS-10.1)

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- History and physical exam of any palpable soft tissue mass should include documentation of any one or more of the following clinical features:
  - Increase in volume/size
  - More than 5 cm in diameter
  - Painful
  - Deep or subfascial location[9,10]
- Plain x-ray is indicated as the initial imaging study, with the exception of individuals with cancer predisposition syndrome.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- MRI without and with contrast or without contrast or US of the area of interest (CPT® 76881 or 76882) is appropriate when ANY of the following are met after plain x-ray:
  - Soft tissue mass(es) which are increasing in volume/size, more than 5 cm in diameter, painful or deep or in a subfascial location[9,10]
  - Surgical planning
- Known or suspected soft tissue mass in an individual with a cancer predisposition syndrome, see **Screening Imaging in Cancer Predisposition Syndromes (PEDONC-2)** in the Pediatric and Special Populations Oncology Imaging Guidelines.
- CT with contrast or CT without and with contrast is appropriate when MRI is contraindicated or after a metal limiting MRI evaluation.
- Advanced imaging is not indicated for:
  - Subcutaneous lipoma with no surgery planned
  - Ganglia, see: **Ganglion Cysts (MS-7)**
  - Sebaceous cyst

Background and Supporting Information

- Plain x-rays can determine if an advanced imaging procedure is indicated, and if so, which modality is most appropriate. If non-diagnostic, these initial plain x-rays can provide complementary information if advanced imaging is indicated.

Evidence Discussion (MS-10.1)

- After a relevant history and physical exam that does not define the etiology of a subcutaneous lesion, plain radiographs are indicated. A plain film may show a benign soft tissue or bone lesion as the etiology and no advanced imaging would be necessary. If plain film is non-diagnostic, it could better direct initial imaging to the

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correct modality. Furthermore, plain x-ray may provide complementary information to advanced imaging allowing a better interpretation.

- Clearly benign findings on exam (lipoma, ganglion, sebaceous cyst) do not need additional imaging prior to treatment unless the imaging was necessary for surgical management or for a possible malignancy.
- Magnetic Resonance Imaging (MRI) is a superior modality for evaluation of soft tissue masses but Computed Tomography (CT) is appropriate for contraindications to CT. Ultrasound can be useful following plain radiograph to further characterize a mass or better delineate extent and origin of the lesion.

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Lesion of Bone (MS-10.2)

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- Complete x-ray 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.
- MRI without and with contrast, MRI without contrast, or CT without contrast may be indicated if ONE of the following applies:
  - Diagnosis uncertain based on plain x-ray appearance
  - Imaging requested for preoperative planning
- MRI without and with contrast or without contrast is appropriate when plain x-ray reveals an osteochondroma with clinical concern of malignant transformation.
- For Paget's Disease:
  - Bone scan (See: **Nuclear Medicine (MS-28)**) **OR**
  - MRI (contrast as requested) can be considered if the diagnosis (based on plain x-rays and laboratory studies) is in doubt.
  - MRI (contrast as requested) can be considered if malignant degeneration, which occurs in up to 10% of cases, is suspected.

Evidence Discussion (MS-10.2)

- After a relevant history and physical exam that does not define the etiology of a bone tumor, plain radiographs are indicated. Plain radiography of the entire bone containing the lesion is necessary because many benign bone tumors have a characteristic appearance on plain x-ray and the risks of advanced imaging would be unnecessary. If plain imaging is equivocal, it may still direct initial imaging to the correct modality. Furthermore, plain x-ray may provide complementary information to advanced imaging allowing a better interpretation.
- If diagnostic uncertainty remains, concerns for malignant degeneration exist, or imaging is requested for surgical planning, advanced imaging is indicated.
- Magnetic Resonance Imaging (MRI) is a superior modality for evaluation of many bone tumors but Computed Tomography (CT) is appropriate for contraindications to MRI.

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Muscle/Tendon Unit Injuries/Diseases (MS-11)

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Muscle/Tendon Unit Injuries/Diseases (MS-11.1)

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- Plain x-ray is the initial imaging study for muscle/tendon unit injuries.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- MRI without contrast or US (CPT® 76881 or CPT® 76882) is supported for **EITHER** of the following:
  - Suspected partial tendon rupture of a specific (named) tendon
  - Complete tendon rupture of a specific named tendon for preoperative planning
- MRI is not medically necessary for muscle belly strains/muscle tears
- See: **Shoulder (MS-19)** for clinical suspicion of a partial or complete rotator cuff tear
- See: **Inflammatory Muscle Diseases (PN-6.2)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines and **Inflammatory Muscle Diseases (PEDMS-10.3)** in the Pediatric Musculoskeletal Imaging Guidelines

Acute Compartment Syndrome (MS-11.2)

MS.MI.0011.2.A
v2.0.2025

- Advanced imaging is not indicated. Diagnosis is made clinically and by direct measurement of compartment pressure and is a surgical emergency.

Background and Supporting Information

- Noninvasive methods of measuring compartment pressures and diagnosing acute compartment syndrome are under study, but are currently not medically necessary and unproven.

Chronic Exertional Compartment Syndrome (MS-11.3)

MS.MI.0011.3.A
v2.0.2025

- Advanced imaging should only be considered when ruling out other potential causes of extremity pain following a plain x-ray and conservative treatment as indicated.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider

Background and Supporting Information

- Direct measurement of compartment pressure remains the diagnostic standard. Noninvasive methods of measuring compartment pressures and diagnosing chronic exertional compartment syndrome are under study, but are currently not medically necessary and unproven.

Evidence Discussion (MS-11)

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Initial evaluation of a patient with a suspected tendon injury should include an accurate history, careful examination and plain radiographs. After x-ray, additional imaging may include MRI or ultrasound, both of which can demonstrate changes to tendons as a result of disease and/or injury. Both MRI and ultrasound findings have been validated against surgical and histological findings. Complete and partial tendon tears can be easily visualized with these modalities and results of advanced imaging can play a role in treatment planning.

There is lack of evidence to support surgical repair of muscle belly strains/tears. As these injuries are treated non-operatively, advanced imaging will typically not change the treatment plan and is not required.

Acute compartment syndrome is diagnosed based on clinical findings and the measurement of compartmental pressures. Advanced imaging does not play a role in the diagnosis or management of this condition and may delay the time to surgical treatment.

For chronic exertional compartment syndrome, dynamic intracompartmental pressure measurements are considered the gold standard for diagnosis. MRI has lacked validity as a non-invasive diagnostic tool for this condition. However, MRI may be useful to rule out other possible sources of pain if plain x-rays fail to find a source.

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Osteoarthritis (MS-12)

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Osteoarthritis (MS-12.1)

MS.OT.0012.1.A
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- Plain x-ray is the initial imaging study for osteoarthritis.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider

Background and Supporting Information

- Plain x-rays are performed initially and will reveal characteristic joint space narrowing, osteophyte formation, cyst formation, and subchondral sclerosis.

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Treatment Planning (Non-Surgical and Surgical, Other Than Joint Replacement) (MS-12.2)

MS.OT.0012.2.A
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- Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider, unless otherwise specified below.
- CT without contrast is appropriate when ALL of the following apply:
  - Requested for treatment planning, AND
  - Congenital or significant atypical post-traumatic arthritic deformities are identified on plain x-ray, AND
  - The aforementioned deformities require further evaluation of their clinical significance, AND
  - The request is related to the shoulder, elbow, wrist, hip, knee, or ankle
- MRI Knee without contrast (CPT® 73721) is appropriate in an individual with osteoarthritis for clinical suspicion of a symptomatic degenerative meniscus tear following plain x-rays and conservative treatment. See: **Knee (MS-25)**
- MRI arthrogram or CT arthrogram is appropriate when joint sparing/salvage reconstructive surgery is planned for the following:
  - Suspected concomitant rotator cuff tear of the shoulder - See: **Shoulder (MS-19)**
  - Suspected concomitant labral tear of the shoulder - See: **Shoulder (MS-19)**
  - Suspected concomitant labral tear of the hip - See: **Hip (MS-24)**
  - Suspected concomitant internal derangement of the knee - See: **Knee (MS-25)**

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Imaging Prior to Non-Customized-to-Patient Joint Replacement Surgery/Not for Intraoperative Navigation (MS-12.3)

MS.OT.0012.3.A
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- **ALL** of the following are required for ***elbow, wrist, hip, knee, or ankle*** advanced imaging after plain x-ray has been performed:
  - Imaging is requested for pre-operative planning for non-customized-to-patient joint replacement surgery/not for intra-operative navigation **AND**
  - Congenital or significant atypical post-traumatic arthritic deformities are identified on plain x-ray **AND**
  - The aforementioned deformities require further evaluation of their clinical significance
  - One of the following advanced imaging studies are indicated after the above criteria are satisfied:
    - **Elbow:** CT Elbow without contrast (CPT® 73200)
    - **Wrist:** CT Wrist without contrast (CPT® 73200)
    - **Hip:** CT Hip without contrast (CPT® 73700) or CT Pelvis without contrast (CPT® 72192)
    - **Knee:** CT Knee without contrast (CPT® 73700)
    - **Ankle:** CT Ankle without contrast (CPT® 73700)
- **ALL** of the following are required for ***shoulder*** advanced imaging after plain x-ray has been performed:
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider **AND**
  - Imaging is requested for pre-operative planning for non-customized-to-patient joint replacement surgery/not for intra-operative navigation
  - The following advanced imaging study(ies) is/are indicated after the above criteria are satisfied:
    - CT Shoulder without contrast (CPT® 73200) **AND/OR**
    - MRI Shoulder without contrast (CPT® 73221)

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Customized-to-Patient Joint Replacement Surgery/Intraoperative Navigation (MS-12.4)

MS.OT.0012.4.A

v2.0.2025

- The following imaging studies are appropriate per the listed criteria after plain x-ray has been performed.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- CT without contrast or MRI without contrast of the shoulder, elbow, wrist, hip, knee, or ankle is appropriate* when the request is for:
  - Treatment planning for customized-to-patient joint replacement surgery **OR**
  - Surgical planning using intraoperative navigation for joint replacement surgery (e.g. MAKOplasty) **AND**
  - The joint replacement surgery has been approved or does not require prior authorization
- *The preoperative imaging listed above is considered **not medically necessary** if any of the following are deemed not medically necessary, not a covered benefit, or experimental, investigational, or unproven by the health plan:
  - Joint replacement surgery
  - Customized-to-patient implant
  - Computer assisted surgical navigation (e.g. MAKOplasty)
- See: **Unlisted Procedures/Therapy Treatment Planning (Preface-4.3)** in the Preface Imaging Guidelines

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Evidence Discussion (MS-12)

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The diagnosis of osteoarthritis can be made based on history, physical exam and plain x-rays. Advanced imaging is typically not necessary for the initial evaluation. For the vast majority of patients, treatment of osteoarthritis does not rely on advanced imaging findings and many can improve with conservative care. Advanced imaging, when not indicated, can result in incidental findings and possible overtreatment with referral to specialists and possibly unnecessary surgery.

However, for patients who are poorly responding to conservative care and there is a concern for concomitant joint pathology (e.g. degenerative meniscus tear, rotator cuff tear, labral tear of the hip or shoulder), advanced imaging may be able to identify additional sources of symptoms. Additionally, when congenital or significant atypical post-traumatic arthritic deformities are present on plain x-ray, CT imaging would be able to provide additional bony detail for treatment planning.

Plain x-rays are typically sufficient for preoperative planning for the majority of patients undergoing joint replacement surgery. However, for those with congenital or significant atypical post-traumatic arthritic deformities, CT scan can be of value for further evaluation/planning. Also, if the joint replacement surgery will use a custom implant, patient specific instrumentation or computer assisted navigation, advanced imaging will be required prior to the surgery.

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Chondral/Osteochondral Lesions (MS-13)

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Chondral/Osteochondral Lesions, Including Osteochondritis Dissecans and Fractures (MS-13.1)

MS.OD.0013.1.A
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- MRI without contrast, MRI with contrast (arthrogram), or CT with contrast (arthrogram) of the joint or area of interest is indicated when **EITHER** of the following are met:
  - Plain x-rays are negative and an osteochondral fracture is still suspected
  - Plain x-ray and clinical exam suggest an unstable osteochondral injury
- 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 (including post-operative fixation) cannot be adequately assessed on follow-up plain x-rays.
- See anatomical table sections for recommendations on anatomy-specific osteochondral injuries
  - See: **Ankle (MS-26)** for suspected osteochondral injury of the ankle
  - See: **Elbow (MS-20)** for suspected osteochondral injury of the elbow

Evidence Discussion (MS-13.1)

Radiography should be the first imaging test performed to evaluate chondral/ osteochondral lesions.

Radiographs help to exclude other causes of pain and to determine skeletal maturity, which significantly affects prognosis and management of Osteochondritis Dissecans lesions (OCD), because open physes have a much higher potential for healing with conservative treatment. In patients with Osteochondritis Dissecans(OCD) or subchondral insufficiency fracture on radiographs or if radiograph is negative but osteochondral fracture is still suspected, MRI without IV contrast maybe indicated to evaluate cartilage for additional injuries and for grading of osteochondral fractures and OCD. MRI is also useful to determine the best method of treatment.

CT without contrast maybe indicated to evaluate patients with OCD to confirm loose bodies or when MRI is not definitive. MR arthrography or CT arthrography is an effective test for locating intra-articular osteochondral fragments, loose bodies and grading chondral and osteochondral lesions.

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Radiographs were found to be substantial to excellent at detecting healing of OCD lesions. In clinical practice, serial radiographs are recommended for monitoring healing of juvenile OCD lesions. Repeat MRI is suggested only if radiographs are not diagnostic for healing and for worsening symptoms, or change in examination.

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Musculoskeletal Imaging Guidelines

Osteoporosis (MS-14)

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Osteoporosis (MS-14)

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- Plain x-ray is not required.
- Quantitative CT (CPT® 77078) can be approved for screening when DXA scanner is unavailable or known to be inaccurate for ANY of the following populations:
  - Women age ≥65 years
  - Men age >70 years
  - Women age <65 years who have additional risk factors for osteoporosis based on medical history and other findings:
    - Estrogen deficiency
    - A history of maternal hip fracture that occurred after age 50 years
    - Low body mass (<127 lb. or 57.6 kg)
    - History of amenorrhea (>1 year before age 42 years)
  - Women age <65 years or men age <70 years who have additional risk factors:
    - Current use of cigarettes
    - Loss of height, thoracic kyphosis
  - Individuals of any age with bone mass osteopenia or fragility fractures on imaging studies such as x-rays, CT, or MRI
  - Individuals age 50 years and older who develop a wrist, hip, spine, or proximal humerus fracture with minimal or no trauma, excluding pathologic fractures
  - Individuals of any age who develop 1 or more insufficiency fractures
  - Premenopausal females or males age 20 to 50 years with risk factors:
    - Individuals with medical conditions that could alter bone mineral density
      - Chronic renal failure
      - Rheumatoid arthritis and other inflammatory arthritides
      - Eating disorders, including anorexia nervosa and bulimia
      - Organ transplantation
      - Prolonged immobilization
      - Conditions associated with secondary osteoporosis, such as gastrointestinal malabsorption or malnutrition, sprue, osteomalacia, vitamin D deficiency, endometriosis, acromegaly, chronic alcoholism or established cirrhosis, and multiple myeloma
      - Individuals who have had gastric bypass for obesity
      - Individuals with an endocrine disorder known to adversely affect bone mineral density (e.g., hyperparathyroidism, hyperthyroidism, or Cushing syndrome)
  - Individuals receiving (or expected to receive) glucocorticoid therapy for >3 months

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- Hypogonadal men older than 18 years and men with surgically or chemotherapeutically-induced castration
- Individuals beginning or receiving long-term therapy with medications known to adversely affect BMD (e.g., anti-convulsant drugs, androgen deprivation therapy, aromatase inhibitor therapy, or chronic heparin)

Note: Repeat screening quantitative computed tomography (QCT) can be approved no sooner than every two years.

- Quantitative CT scan (CPT® 77078) can be approved for non-screening/monitoring when DXA scanner is unavailable or known to be inaccurate for ANY of the following circumstances:
  - Follow-up in cases where QCT was the original study
  - Multiple healed vertebral compression fractures
  - Significant scoliosis
  - Advanced arthritis of the spine due to increased cortical sclerosis often with large marginal osteophytes
  - Obese individual over the weight limit of the dual-energy x-ray absorptiometry (DXA) exam table
  - Individuals with BMI >35kg/m^2
  - Extremes in body height (i.e. very large and very small individuals)
  - Individuals with extensive degenerative disease of the spine
  - A clinical scenario that requires sensitivity to small changes in trabecular bone density (parathyroid hormone and glucocorticoid treatment monitoring).

Note: Repeat non-screening/monitoring QCT can be approved no earlier than one year following a change in treatment regimen, and only when the results will directly impact a treatment decision.

Evidence Discussion (MS-14)

Osteoporotic fractures are associated with disability, loss of independence, limitation of ambulation, chronic pain, and decreased quality of life. Approximately 20% of hip fracture patients require long-term nursing care, and 21-30% of patients who experience a hip fracture die within one year.

The primary diagnostic test used to screen for osteoporosis is the central DXA (dual xray absorptiometry) which accurately measures bone mineral density at the hip and lumbar spine. DXA accuracy and reproducibility has led to the established standards for diagnosis of osteoporosis by the World Health Organization. The radiation dose for both lumbar spine and hip scanning in a DXA scan is approximately equivalent to that of a chest xray.

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Quantitative CT is regarded as a secondary tool after DXA for screening for osteoporosis. QCT provides a volumetric bone mineral density, as opposed to DXA which is based on a 2-D area measurement. QCT can be performed on most commercially available CT scanners, with the required densitometry analysis software. Quantitative CT is highly accurate in determining tissue density within a region of interest. Indications for QCT are the same as for DXA, however DXA is recommended as the first-line screening and follow-up test for bone density. If DXA is not available, QCT may be used as a secondary technique. Selected conditions in which QCT is considered superior to DXA include extremes in body height, BMI >35, clinical scenarios when an increased sensitivity to small changes in trabecular bone density is required, and in patients with advanced degenerative bony changes in the spine. A potential harm of Quantitative CT is increased radiation exposure (1-10 mSv) as compared to <0.1 mSv for DXA scan.

Radiography has a lower sensitivity for bone loss than DXA. Osteopenia is not a reliable finding on xray until 30-40% of the bone has been lost. There is insufficient evidence to support the use of xray as a screening tool in patients suspected of having low bone mineral density. Patients whose xrays report osteopenia and/or fragility fractures should be referred for DXA for further characterization of bone density.

There is insufficient evidence to support the current use of quantitative ultrasound as a screening tool in patients suspected of having low bone mineral density.

The American College of Radiology Appropriateness Criteria supports DXA as the primary diagnostic choice to screen women >65 years of age and men >70 years of age for osteoporosis, and for postmenopausal women <65 years of age with additional risk factors for fracture.

The National Osteoporosis Foundation recommends bone mineral density testing in all women age 65 and older and all men age 70 and older, and in postmenopausal women younger than 65 years and men aged 50-69 years based on their risk factor profile, including if they had a fracture as an adult.

The USPSTF found convincing evidence that bone measurement tests are accurate for detecting osteoporosis and predicting osteoporotic fractures in women and men, and that drug therapies reduce subsequent fracture rates in postmenopausal women. The USPSTF recommends screening for osteoporosis with bone measurement testing to prevent osteoporotic fractures in women 65 years and older (B recommendation), and in postmenopausal women younger than 65 who are at increased risk of osteoporosis (B recommendation). The USPSTF concluded that current evidence is insufficient to assess the balance of benefits and harms of screening for osteoporosis in men.

One trial (Shepstone et al) evaluated the effect of screening for osteoporosis on anxiety and quality of life and found no difference between screened and unscreened intervention groups. Potential harms of screening for osteoporosis include false negative

results, as well as false positive results that can lead to unnecessary treatment, although the USPSTF determined that the potential harms of osteoporosis drug therapies are small.

Central DXA is the "gold standard" for serial assessment of BMD and an important component of osteoporosis management. Biological changes in bone density are small compared to the inherent error in the test itself, and interpretation of serial bone density studies depends on appreciation of the smallest change in BMD that is beyond the range of error of the test. This least significant change (LSC) varies with the specific instrument used, patient population, measurement site, technologist's skill with patient positioning and test analysis, and the confidence intervals used. QCT of the lumbar spine can also be used for serial assessment of bone mineral density changes in men and women. The National Osteoporosis Foundation recommends repeat bone mineral density assessments one to two years after initiating medical therapy for osteoporosis and every two years thereafter, but recognizes that testing more frequently may be warranted in certain clinical situations, and may be needed less frequently in patients without major risk factors or significant bone density loss on initial BMD testing.

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Rheumatoid Arthritis (RA) and Inflammatory Arthritis (MS-15)

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Rheumatoid Arthritis (RA) and Inflammatory Arthritis (MS-15.1)

MS.RA.0015.1.A

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- Plain x-ray, physical exam and appropriate laboratory studies* are required prior to advanced imaging.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- MRI without contrast OR MRI without and with contrast or US (CPT® 76881 or CPT® 76882) is appropriate for the most symptomatic joint, or of the dominant hand or wrist, in **ALL** of the following situations:
  - When diagnosis is uncertain prior to initiation of drug therapy.
  - To study the effects of treatment with disease modifying anti-rheumatic drug (DMARD) therapy.
  - To identify seronegative RA individuals that might benefit from early DMARD therapy.
  - To determine change in treatment, such as:
    - Switching from standard DMARD therapy to tumor necrosis factor (TNF) therapy.
    - Changing to a different TNF drug therapy, then one MRI (contrast as requested) of a single joint can be performed.
    - Addition of other treatments, including joint injections
- MRI or US should NOT be considered for routine follow-up of treatment.

Background and Supporting Information

- *Examples of appropriate laboratory studies may include: Lyme titers, rheumatoid factor (RF), anti-cyclic citrullinated peptide (anti-CCP), sedimentation rate (ESR), C-reactive protein (CRP), and antinuclear antibody (ANA)], joint fluid analysis

Evidence Discussion (MS-15.1)

Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by persistent inflammation and joint damage. Clinical and laboratory assessment of RA remains the cornerstone of diagnosis and response to treatment. Imaging modalities such as plain radiographs serve as important adjuncts to examination and laboratory findings in the evaluation of suspected inflammatory arthritis. Plain radiographs should be obtained first, and inconclusive or non-diagnostic imaging results can be further evaluated with advanced imaging. They have a low sensitivity compared with CT, MRI, or Ultrasound (US) in detecting erosions and multiple views are often needed but location and

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distribution of erosions are usually adequate for diagnosis. MRI allows assessment of all structures as well as bone edema and baseline bone edema on low and high field MRI in patients with early RA is predictive of future radiographic damage. Joints and bones in the hand are often affected in RA and assessing changes in these joints can help in therapy monitoring. MRI and US play important roles in detecting subclinical disease in patients with inflammatory arthritis. These modalities have higher sensitivity in detecting subclinical synovitis, tenosynovitis, osteitis, and early erosive disease compared with physical exam and xray, therefore useful in early diagnosis and evaluating response to treatment.

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Pigmented Villonodular Synovitis (PVNS) (MS-15.2)

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- MRI of the affected joint without contrast or CT of the affected joint with contrast (arthrogram) if MRI contraindicated is supported following plain x-rays.
    - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider

Evidence Discussion (MS-15.2)

Pigmented villonodular synovitis (PVNS) is a benign, hypertrophic synovial process characterized by villous, nodular, and villonodular proliferation and pigmentation from hemosiderin. Hemosiderin deposition is more prominent with diffuse disease. Radiographs are non-specific and may appear normal 20% of the time but joint effusion, soft-tissue swelling, extrinsic erosion of bone, absence of calcification, preservation of joint space, and/or normal bone mineralization may be seen in diffuse intraarticular PVNS. Localized form my appear normal on plain radiographs. CT shows nonspecific synovial thickening and optimally demonstrates bone erosion but the extent of lesions are not well depicted with this modality, whereas MR can demonstrate extent of disease. MR is used after plain radiography because monoarticular arthropathy can be nonspecific but there can be pathopnomic low signal intensity lesions seen on T2-weighted. MR is optimal for demonstrating the relationship of extraarticular lesions to the the tendon sheath to suggest the diagnosis.

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Post-Operative Joint Replacement Surgery (MS-16)

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Post-Operative Joint Replacement Surgery – General (MS-16.1)

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- CT without contrast, MRI without contrast, or nuclear medicine studies (see: **MS-28** for nuclear medicine studies) with **ALL** of the following:
  - Recent plain x-ray is nondiagnostic
  - Suspected aseptic loosening of orthopaedic joint replacements
    - CT shoulder without contrast (CPT® 73200) can be performed following plain x-rays regardless of plain x-ray findings. See: **Shoulder (MS-19)**
      - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- CT without contrast or MRI without contrast with **ALL** of the following:
  - Negative plain x-ray
  - High suspicion for a periprosthetic fracture
    - CT Shoulder without contrast (CPT® 73200) can be performed following plain x-rays regardless of plain x-ray findings. See: **Shoulder (MS-19)**
      - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
- Joint aspiration is the initial evaluation after plain x-ray for a painful joint replacement when periprosthetic infection is suspected.
  - Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider
  - For suspected infection with negative or inconclusive joint aspiration culture see: **Nuclear Medicine (MS-28)**
- MRI Hip without contrast (CPT® 73721) or Ultrasound (CPT® 76881 or CPT® 76882) are both appropriate for **EITHER** of the following:
  - Diagnosis of ALVAL (aseptic lymphocytic-dominated vasculitis-associated lesion) pseudotumors surrounding metal-on-metal (MoM) hip prostheses. One of these two imaging modalities can be approved but not both. See: **Soft Tissue Mass or Lesion of Bone (MS-10)**
  - Metal-On-Metal (MoM) Hip Prostheses that are considered high-risk for implant performance issues from THA (Total hip arthroplasty) cup-neck impingement and subsequent ALTR (adverse local tissue reaction) with Co and Cr ion levels greater than 10 ppb.
- CT Hip without contrast (CPT® 73700) **OR** MRI Hip without contrast (CPT® 73721):
  - Evaluate suspected particle disease (aggressive granulomatous disease) of the hip when infection has been excluded.

- For specific joints post-operative from replacement surgery:
  - See: **Shoulder (MS-19)**
  - See: **Elbow (MS-20)**
  - See: **Wrist (MS-21)**
  - See: **Hip (MS-24)**
  - See: **Knee (MS-25)**
  - See: **Ankle (MS-26)**

Background and Supporting Information

- Complications following joint replacement surgery include (not limited to) periprosthetic fracture, infection, aseptic loosening, failure of fixation/component malposition, and wear.

Evidence Discussion (MS-16)

- The American College of Radiology (ACR) recommends plain x-rays as the initial study for routine follow up of asymptomatic patients and for symptomatic patients who have undergone joint replacement surgery. Plain x-rays can identify fractures or show signs of loosening, wear, osteolysis or infection. When plain x-rays are negative or inconclusive and there is a suspicion for aseptic loosening or fracture, advanced imaging can help to identify these conditions.
- The first line of preoperative evaluation for a suspected prosthetic joint infection should be plain x-rays, blood tests and joint aspiration with synovial fluid laboratory analysis. Although both false-positive and false-negative results may occur, joint aspiration with synovial fluid analysis remains the most useful test for confirming the presence or absence of infection and identifying the causative organism. If there is a negative or inconclusive joint aspiration and infection is still suspected, advanced imaging can provide additional information.
- For patients with negative or non-diagnostic x-rays for whom there is suspicion of a soft tissue abnormality (e.g. tendinitis, tendinopathy, bursitis, arthrofibrosis), a course of conservative care will allow many patients to improve. If there is failure to improve, advanced imaging would be appropriate. However, if there is concern for a rotator cuff tear in a patient who underwent shoulder replacement surgery, conservative care would not be necessary.
- Patients with metal on metal hip replacements are at risk for adverse local tissue reactions (ALTRs) including metallosis, pseudotumor and generalized synovitis that can result in tissue damage. After initial x-rays, advanced imaging is recommended for symptomatic patients.

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Limb Length Discrepancy (MS-17)

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Limb Length Discrepancy (MS-17.1)

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- Either plain radiographic or "CT scanogram," both reported with CPT® 77073, is appropriate to radiographically evaluate limb length discrepancy due to congenital anomalies, acquired deformities, growth plate (physeal injuries or surgery), or inborn errors of metabolism.
  - A diagnostic advanced imaging CPT code (e.g., CPT® 73700, CPT® 73701, or CPT® 73702) is not indicated for evaluation of limb length discrepancy.

Evidence Discussion (MS-17)

- X-ray (standing anteroposterior radiograph) is the most reliable choice for evaluation of limb length discrepancy. Imaging may be done using a CT scanogram as an analogue to conventional x-ray.
- Advanced imaging modalities are not indicated for evaluating limb length discrepancy. Alfuth, et al state that MRI "may be more expensive, may require sedation in some patients, often needs a longer time to schedule and to carry out the examination, and may be not allowed in patients with specific implanted devices".

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Musculoskeletal Imaging Guidelines

Anatomical Area Tables – General Information (MS-18)

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Anatomical Area Tables – General Information (MS-18)

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The imaging guidelines for each anatomical area are presented in table format. The table below includes a description of how each column header should be utilized for each guideline **Shoulder (MS-19)** through **Foot (MS-27)**.

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)

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Shoulder (MS-19)

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Shoulder (MS-19)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])

Condition (Individual's Condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
General Shoulder Pain	Yes	• MRI Shoulder without contrast (CPT®73221) **OR** • US Shoulder (CPT® 76881 or CPT® 76882) **OR** • CT Shoulder with contrast (arthrogram) (CPT®73201) if MRI contraindicated	
Symptomatic Loose Bodies	No	• MRI Shoulder without contrast (CPT®73221)	
Impingement	Yes	• MRI Shoulder without contrast (CPT®73221) **OR** • MRI Shoulder with contrast (arthrogram) (CPT®73222) **OR** • US Shoulder (CPT® 76881 or CPT® 76882) **OR** • CT Shoulder with contrast (CPT® 73201) if MRI is contraindicated	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
Tendonitis/ Bursitis	Yes	• MRI Shoulder without contrast (CPT®73221) **OR** • US Shoulder (CPT® 76881 or CPT® 76882)	
Tendon Rupture (Biceps Long Head)	No	• When clinical exam is inconclusive due to inability to visualize a "Popeye" sign clinically, or for preoperative planning: ◦ MRI Shoulder without contrast (CPT®73221) **OR** ◦ US Shoulder (CPT® 76881 or CPT® 76882)	
Tendon Rupture (Pectoralis Major/Minor)	No	• When clinical exam is inconclusive, or for preoperative planning: ◦ MRI Shoulder without contrast (CPT®73221) **OR** ◦ MRI Chest without contrast (CPT®71550) **OR** ◦ US Shoulder (CPT® 76881 or CPT® 76882)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Shoulder Rotator Cuff Tear (Complete and Partial)	Yes*	• MRI Shoulder without contrast (CPT®73221) **OR** • MRI Shoulder with contrast (arthrogram) (CPT®73222) **OR** • US Shoulder (CPT® 76881 or CPT® 76882) **OR** • CT Shoulder with contrast (arthrogram) (CPT®73201) if MRI is contraindicated	*Conservative treatment is not required with an acute shoulder injury prior to the onset of symptoms and consideration of surgery. If surgery is being considered, MRI without contrast, MRI with contrast (arthrogram), or CT arthrogram are required

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Partial Tendon Rupture (Excluding Partial Rotator Cuff Tears)	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Shoulder without contrast (CPT®73221) **OR** ◦ US Shoulder (CPT®76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/ muscle tears.
Complete Rupture – Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Shoulder without contrast (CPT®73221) **OR** ◦ US Shoulder (CPT®76881 or CPT® 76882)	
Shoulder Labral Tear (e.g., SLAP, ALPSA, HAGL)	Yes	• MRI Shoulder with contrast (arthrogram) (CPT®73222) **OR** • MRI Shoulder without contrast (CPT®73221) **OR** • CT Shoulder with contrast (arthrogram) (CPT®73201)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Shoulder Dislocation/ Subluxation/ Instability, or Bankart/ Hill-Sachs Lesions	Yes*	• Individuals 40 years of age or younger with a first time dislocation, and in individuals with recurrent dislocations, conservative treatment not required: ◦ MRI Shoulder with contrast (arthrogram) (CPT®73222) **OR** ◦ MRI Shoulder without contrast (CPT®73221) **OR** ◦ CT Shoulder with contrast (arthrogram) (CPT®73201) **OR** ◦ CT Shoulder without contrast (CPT®73200) if MRI is contraindicated	*Conservative treatment is required in individuals over age 40 with a first time dislocation.

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
Frozen Shoulder/ Adhesive Capsulitis	Yes	• MRI Shoulder without contrast (CPT® 73221)	
Avascular Necrosis (AVN) of the Humeral Head	No	• See: **AVN (MS-4.1)**	
Acromio-clavicular (AC) Separation	No	• MRI Shoulder without contrast (CPT® 73221) to rule out possible rotator cuff tear following AC separation	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Sterno-clavicular (SC) Dislocation	No	• X-rays are **NOT** required • For evident or suspected sterno-clavicular dislocations:[24,25,26] ◦ CT Chest without contrast (CPT® 71250) **OR** CT Chest with contrast (CPT® 71260) ◦ MRI Chest without contrast (CPT® 71550) **OR** MRI Chest without and with contrast (CPT® 71552) for: ▪ Differentiating physeal injury from sternoclavicular dislocation in younger patients aged < 25 years[24] **OR** ▪ Planning for operative repair[26] • For proximal (medial) 1/3 fractures of the clavicle: ◦ CT Chest with contrast (CPT® 71260) **OR** CT Chest without contrast (CPT® 71250) **OR** ◦ MRI Chest without contrast (CPT® 71550) **OR** MRI Chest without and with contrast (CPT® 71552)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative Shoulder Surgery for Impingement, Rotator Cuff Tear, and/or Labral Tear	Yes	• In symptomatic individuals: ◦ MRI Shoulder without contrast (CPT® 73221) **OR** ◦ MRI Shoulder with contrast (arthrogram) (CPT® 73222) • US Shoulder (CPT® 76881 or CPT® 76882) is also appropriate in symptomatic individuals following rotator cuff repair • CT Shoulder with contrast (arthrogram) (CPT® 73201) if MRI contraindicated	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative Shoulder (Glenohumeral) Replacement Surgery	No	• For suspected aseptic loosening or fracture as additional imaging following plain x-rays: ◦ CT Shoulder without contrast (CPT® 73200) **OR** ◦ MRI Shoulder without contrast (CPT® 73221) **OR** ◦ US Shoulder (CPT® 76881 or CPT® 76882) **OR** ◦ Bone scan (CPT® 78315) **OR** ◦ Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803 or CPT® 78831) **OR**	See also: **Post-Operative Joint Replacement (MS-16)**

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		◦ Hybrid SPECT/CT (CPT® 78830) • For suspected infection with negative or inconclusive joint aspiration culture: ◦ MRI Shoulder without contrast (CPT® 73321) **OR** ◦ MRI Shoulder without and with contrast (CPT® 73223) **OR** ◦ CT Shoulder with contrast (CPT® 73201) **OR** ◦ US Shoulder (CPT® 76881 or CPT® 76882) **OR** ◦ See also: **Nuclear Medicine (MS-28)** • For possible rotator cuff tear:	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's Condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		◦ CT Shoulder with contrast (arthrogram) (CPT® 73201) **OR** ◦ MRI Shoulder without contrast (CPT® 73221) **OR** ◦ US Shoulder (CPT® 76881 or CPT® 76882) • For possible nerve injury: ◦ MRI Shoulder without contrast (CPT® 73221) **OR** ◦ US Shoulder (CPT® 76881 or CPT® 76882)	

Evidence Discussion (MS-19)

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For most patients with a shoulder complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. It has been reported that approximately 30 – 40 percent of middle-aged patients and an even higher percentage of older patients have asymptomatic rotator cuff and superior labral tears. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of shoulder conditions are also recommended by the American College of Radiology Appropriate Use Criteria. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for many shoulder conditions does not rely on advanced imaging results and most patients will improve within a few weeks or months with conservative care. However, for some shoulder conditions (e.g., loose bodies, suspected full thickness rotator cuff tear when there is consideration for surgery, issues after shoulder replacement surgery), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications, and contrast complications.

For many shoulder conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possesses its own set of significant risks.

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Elbow (MS-20)

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Elbow (MS-20)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
General Elbow Pain	Yes	• MRI Elbow without contrast (CPT® 73221) **OR** • US Elbow (CPT® 76881 or CPT® 76882)	
Symptomatic Loose Bodies	No	• MRI Elbow without contrast (CPT® 73221) **OR** • MRI Elbow with contrast (arthrogram) (CPT® 73222) **OR** • CT Elbow without contrast (CPT® 73200) **OR** • CT Elbow with contrast (arthrogram) (CPT® 73201)	
Tendonitis	Yes	• MRI Elbow without contrast (CPT® 73221) **OR** • US Elbow (CPT® 76881 or CPT® 76882)	
Bursitis	Yes	• MRI Elbow without and with contrast (CPT® 73223) **OR** • MRI Elbow without contrast (CPT® 73221) **OR** • US Elbow (CPT® 76881 or CPT® 76882)	

Musculoskeletal Imaging Guidelines

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Lateral (tennis elbow) or Medial (golfer's elbow) Epicondylitis	Yes	• To confirm clinical diagnosis of epicondylitis if symptoms persist for longer than 6 months despite at least 6 weeks conservative treatment in the last 3 months: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882)	Epicondylitis, caused by tendon degeneration and tear of the common extensor tendon laterally or of the common flexor tendon medially, is a common clinical diagnosis for which imaging is not medically necessary except as noted.

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Suspected Osteochondral Injury	No	• If plain x-rays are negative and an osteochondral fracture is still suspected: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ MRI Elbow with contrast (arthrogram) (CPT® 73222) **OR** ◦ CT Elbow without contrast (CPT® 73200) **OR** ◦ CT Elbow with contrast (arthrogram) (CPT® 73201)	See: **Chondral/ Osteochondral Lesions (MS-13** for other osteochondral injury scenarios
Ruptured Biceps Insertion at Elbow	No	• When clinical exam is inconclusive or for preoperative planning: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882)	

Musculoskeletal Imaging Guidelines

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Ruptured Triceps Insertion at Elbow	No	• When clinical exam is inconclusive or for preoperative planning: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882)	
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/muscle tears.
Complete Rupture – Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Trauma	No	• When surgery is being considered: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ CT Elbow without contrast (CPT® 73200)	
Ulnar Collateral Ligament (UCL) Tear	No	• Following acute or repetitive (including overhead throwing athletes) elbow trauma: ◦ MRI Elbow with contrast (arthrogram) (CPT® 73222) **OR** ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882) **OR** ◦ CT Elbow with contrast (arthrogram) (CPT® 73201)	
Suspected Nerve Abnormality	NA	• This condition is imaged according to the criteria found in the Peripheral Nerve and Neuromuscular Disorders Guidelines. See: **Focal Neuropathy (PN-2)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative	Yes	• CT Elbow without contrast (CPT® 73200) in symptomatic post-operative individuals following surgical treatment of complex fractures **OR** • MRI Elbow without contrast (CPT® 73221) in symptomatic post-operative individuals following soft-tissue surgery	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative Elbow Replacement Surgery	No	• For suspected aseptic loosening or periprosthetic fracture when recent plain x-ray is nondiagnostic: ◦ CT Elbow without contrast (CPT® 73200) **OR** ◦ Bone scan (CPT® 78315) **OR** ◦ Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803 or 78831) **OR** ◦ Hybrid SPECT/CT (CPT® 78830) • For suspected infection with negative or inconclusive joint aspiration culture: ◦ MRI Elbow without contrast (CPT® 73221) **OR** ◦ MRI Elbow without and with contrast (CPT® 73223) **OR** ◦ CT Elbow with contrast (CPT® 73201) **OR** ◦ US Elbow (CPT® 76881 or CPT® 76882) **OR** ◦ See also: **Nuclear Medicine (MS-28)**	

Evidence Discussion (MS-20)

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A diagnosis for the vast majority of elbow conditions can be made based on a detailed history, physical examination and plain x-rays. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate elbow abnormalities in asymptomatic patients and that the prevalence of asymptomatic abnormalities increases with age. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of elbow conditions are supported in the literature. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for many elbow conditions does not rely on advanced imaging results and most patients will improve within a few weeks or months with conservative care. Lateral epicondylitis may take 6 months or longer to improve, however, advanced imaging rarely is needed to make the diagnosis or play a role in treatment decision making. However, for some elbow conditions (e.g. loose bodies, suspected tendon or ligament tears, issues after elbow replacement surgery), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

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Wrist (MS-21)

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Wrist (MS-21)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])

Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
General Wrist Pain	Yes	• MRI Wrist without contrast (CPT® 73221) **OR** • MR Wrist with contrast (arthrogram) (CPT® 73222)[2] **OR** • CT Wrist with contrast (arthrogram) (CPT® 73201)[2] **OR** • CT Wrist without contrast (CPT® 73700)[2] **OR** • US Wrist (CPT® 76881 or CPT® 76882)	
Tendonitis	Yes	• MRI Wrist without contrast (CPT® 73221) **OR** • MRI Wrist without and with contrast (CPT® 73220)[2] **OR** • US Wrist (CPT® 76881 or CPT® 76882)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Kienbock's Disease (Avascular Necrosis (AVN) of the Lunate)/ Preiser's Disease (Avascular Necrosis (AVN) of the Scaphoid)	No	See **AVN (MS-4.1)**	
Suspected Navicular/ Scaphoid Fracture	No	When suspected based on history and physical exam, advanced imaging guided by: **Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints (MS-5.2)**	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Distal Radioulnar Joint (DRUJ) Instability	No	• CT of both wrists without contrast (CPT® 73200) (should include wrists in supination and pronation)	
Complex Distal Radius/ Ulna Fracture	No	• CT Wrist without contrast (CPT® 73200)	
Carpal Tunnel Syndrome/ Ulnar Tunnel Syndrome	NA	• This condition is imaged according to the criteria found in the Peripheral Nerve and Neuromuscular Disorders Guidelines. See **Focal Neuropathy (PN-2)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines	
Intrinsic Ligament (e.g. scapholunate)/ Triangular Fibrocartilage Complex (TFCC) Injuries	Yes	• MRI Wrist with contrast (arthrogram) (CPT® 73222) **OR** • CT Wrist with contrast (arthrogram) (CPT® 73201)	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Complete Rupture - Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Wrist without contrast (CPT® 73221) **OR** ◦ MRI Wrist without and with contrast (CPT® 73220)[2] **OR** ◦ US Wrist (CPT® 76881 or CPT® 76882)	
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Wrist without contrast (CPT® 73221) **OR** ◦ MRI Wrist without and with contrast (CPT® 73220)[2] **OR** ◦ US Wrist (CPT® 76881 or CPT® 76882)	MRI is **NOT** needed for muscle belly strains/muscle tears.

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative	Yes	• CT Wrist without contrast (CPT® 73200) in symptomatic individuals following surgery for navicular/scaphoid fractures and complex distal radius/ulna fractures **OR** • MRI Wrist with contrast (arthrogram) (CPT® 73222) in symptomatic individuals following DRUJ or TFCC surgery	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative Wrist Replacement Surgery	No	• For suspected aseptic loosening or periprosthetic fracture when recent plain x-ray is nondiagnostic: ◦ CT Wrist without contrast (CPT® 73200) **OR** ◦ Bone scan (CPT® 78315, 78300, or 78306) **OR** ◦ Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803 or CPT® 78831) **OR** ◦ Hybrid SPECT/CT (CPT® 78830) • For suspected infection with negative or inconclusive joint aspiration culture: ◦ MRI Wrist without contrast (CPT® 73221) **OR** ◦ MRI Wrist without and with contrast (CPT® 73223) **OR** ◦ CT Wrist with contrast (CPT® 73201) **OR** ◦ US Wrist (CPT® 76881 or CPT® 76882) **OR** ◦ See also: **Nuclear Medicine (MS-28)**	

One Study/Area Only

In hand and wrist advanced imaging, studies are frequently ordered of both areas. This is unnecessary since wrist MRI will image from above the wrist to the mid-metacarpal area. **Only one** CPT® code should be reported.

Evidence Discussion (MS-21)

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For the vast majority of wrist conditions, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate wrist abnormalities in asymptomatic patients and that the prevalence of asymptomatic abnormalities increases with age. Iordache, et. al. concluded the prevalence of incidental TFCC findings in MRI scans of asymptomatic subjects is high. Also concluded was the presence of an abnormal TFCC on MRI may be of questionable clinical meaning, because there is a high incidence of TFCC abnormalities in asymptomatic subjects, particularly those over the age of 50. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of wrist conditions are supported in the literature. The American College of Radiology Appropriate Use Criteria also recommends initial plain x-rays prior to advanced imaging for both chronic wrist pain and acute wrist trauma. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for many wrist conditions does not rely on advanced imaging results and many patients will improve within a few weeks or months with conservative care. However, for some wrist conditions (e.g. suspected tendon tears, suspected scaphoid fracture, issues after wrist replacement surgery), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many wrist conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Hand (MS-22)

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Hand (MS-22)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
General Hand Pain	Yes	• MRI Hand or Finger without contrast (CPT® 73218) **OR** • MRI Hand or Finger without and with contrast (CPT® 73220)[3] **OR** • US Hand (CPT® 76881 or CPT® 76882)	
Tendonitis	Yes	• MRI Hand or Finger without contrast (CPT® 73218) **OR** • MRI Hand or Finger without and with contrast (CPT® 73220)[3] **OR** • US Hand or Finger (CPT® 76881 or CPT® 76882)	
Occult Fracture	No	• Advanced imaging guided by: **Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints (MS-5.2)**	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Complex Fracture	No	• CT Hand or Finger without contrast (CPT® 73200) when plain x-ray shows a complex fracture	
Ulnar Collateral Ligament (UCL) Thumb Injury	No	• If rule out for Stener lesion or complete tear of UCL of the thumb MCP joint: ◦ MRI Thumb without contrast (CPT® 73218) **OR** ◦ US Thumb (CPT® 76881 or CPT® 76882)	Also called "Gamekeeper's Thumb" or "Skier's Thumb"
Complete Rupture – Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Hand or Finger without contrast (CPT® 73218) **OR** ◦ MRI Hand or Finger without and with contrast (CPT® 73220)[3] **OR** ◦ US Hand or Finger (CPT® 76881 or CPT® 76882)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Hand or Finger without contrast (CPT® 73218) **OR** ◦ MRI Hand or Finger without and with contrast (CPT® 73220)[3] **OR** ◦ US Hand or Finger (CPT® 76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/muscle tears.
Post-Operative	Yes	• In symptomatic post-operative individuals following surgical treatment for complex hand or finger fractures or following soft-tissue surgery: ◦ CT Hand or Finger without contrast (CPT® 73200) **OR** ◦ MRI Hand or Finger without contrast (CPT® 73218)	

One Study/Area Only

In hand and wrist advanced imaging, studies are frequently ordered of both areas. This is unnecessary since wrist MRI will image from above the wrist to the mid-metacarpal area. **Only one CPT ® code should be reported**.

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Evidence Discussion (MS-22)

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For most patients with a hand complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms and that the prevalence of asymptomatic abnormalities increases with age. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Ganguli et. al. reported incidental findings on screening and diagnostic tests are common and may trigger cascades of further testing and treatment. Also reported was that such cascades of care come with substantial potential for harm (including patient anxiety and additional treatment risks) in addition to monetary costs and inconvenience.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. The American College of Radiology Appropriate Use Criteria recommends initial plain x-rays prior to advanced imaging for both chronic hand pain and acute hand trauma. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for some hand conditions such as tendonitis and generalized hand pain does not rely on advanced imaging results and many patients will improve within a few weeks or months with conservative care. However, for some hand conditions (e.g. suspected tendon tears, suspected ulnar collateral ligament tear, complex fractures), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many hand conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Pelvis (MS-23)

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Pelvis (MS-23)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
General Pain-Pelvis	Yes	• MRI Pelvis without contrast (CPT® 72195) **OR** • MRI RT and/or LT Hip without contrast (CPT® 73721)	
Tendonitis	Yes	• MRI Pelvis without contrast (CPT® 72195) **OR** • MRI RT and/or LT Hip without contrast (CPT® 73721)	
Occult/Stress/ Insufficiency Fracture	No	When suspected based on history and physical exam, advanced imaging guided by: **Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints (MS-5.2)** for occult/ stress/insufficiency fractures of the pelvis	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Complex Fracture/ Dislocation - Pelvis, Sacrum and Acetabulum	No	• CT Pelvis without contrast (CPT® 72192)	Additionally, 3D rendering may be appropriate for preoperative planning. See: **3D Rendering (MS-3)**
Sacro-iliac (SI) Joint Pain, Sacroiliitis, Coccydynia	Yes	• Advanced imaging guided by: ◦ **Sacroiliac (SI) Joint Pain/ Sacroiliitis (SP-10.1)** in the Spine Imaging Guidelines ◦ **Coccydynia without Neurological Features (SP-5.2)** in the Spine Imaging Guidelines	
Piriformis Syndrome	NA	• This condition is imaged according to the criteria found in the Peripheral Nerve and Neuromuscular Disorders Guidelines. See: **Focal Neuropathy (PN-2)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Partial Tendon Rupture	No	• MRI Pelvis without contrast (CPT® 72195) for a suspected partial tendon rupture of a specific named tendon not otherwise specified	MRI is *NOT* needed for muscle belly strains/muscle tears.
Osteitis Pubis/ Symphysis Pubis Diastasis	Yes	• MRI Pelvis without contrast (CPT® 72195)	
Athletic Pubalgia (Sports Hernia)	Yes	• To evaluate for the cause of suspected athletic pubalgia: ◦ MRI Pelvis without contrast (athletic pubalgia protocol) (CPT® 72195) **OR** ◦ Dynamic pelvic ultrasound (CPT® 76857)	
Post-Operative	Yes	• CT Pelvis without contrast (CPT® 72192) in symptomatic individuals following surgery for complex pelvic ring/acetabular fractures	

Evidence Discussion (MS-23)

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For many patients with musculoskeletal pelvic issue, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. Register et. al. found labral tears in 69% of asymptomatic volunteers. It was also reported that the asymptomatic participants in their study older than 35 years were 13.7 time more likely to have a chondral defect and 16.7 times more likely to have a subchondral cyst compared with participants 35 or younger. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Ganguli et. al. reported incidental findings on screening and diagnostic tests are common and may trigger cascades of further testing and treatment. Also reported was that such cascades of care come with substantial potential for harm (including patient anxiety and additional treatment risks) in addition to monetary costs and inconvenience.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of musculoskeletal pelvic and hip conditions are also recommended by the American College of Radiology Appropriate Use Criteria. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for some musculoskeletal pelvic conditions (e.g. tendonitis, osteitis pubis) do not rely on advanced imaging results and many patients will improve within a few weeks or months with conservative care. However, for some musculoskeletal pelvic conditions (e.g. complex fractures, suspected tendon tear), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many patients with a musculoskeletal pelvic condition, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Hip (MS-24)

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Hip (MS-24)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
General Hip Pain	Yes	• MRI Hip without contrast (CPT® 73721) **OR** • US Hip (CPT® 76881 or CPT® 76882)	
Symptomatic Loose Bodies	No	• MRI Hip without contrast (CPT® 73721)	
Tendonitis/ Bursitis	Yes	• MRI Hip without contrast (CPT® 73721) **OR** • US Hip (CPT® 76881 or CPT® 76882)	
Hip Abductor Tendon Tear/ Avulsion	No	• MRI Hip without contrast (CPT® 73721) **OR** • US Hip (CPT® 76881 or CPT® 76882)	
Complete Rupture – Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Hip without contrast (CPT® 73721) **OR** ◦ US Hip (CPT® 76881 or CPT® 76882)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Hip without contrast (CPT® 73721) **OR** ◦ US Hip (CPT® 76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/ muscle tears.
Occult/Stress/ Insufficiency Fracture	No	When suspected based on history and physical exam, advanced imaging guided by: **Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints (MS-5.2)** for occult/ stress/insufficiency fractures of the hip	
Avascular Necrosis (AVN) of the Femoral Head	No	• See: **AVN (MS-4.1)**	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Labral Tear	Yes	• MRI Hip with contrast (arthrogram) (CPT® 73722) **OR** • CT Hip with contrast (arthrogram) (CPT® 73701) **OR** • MRI Hip without contrast (CPT® 73721)	
Femoroacetabular Impingement	Yes	• For preoperative planning for femoroacetabular impingement: ◦ MRI Hip without contrast (CPT® 73721) **OR** ◦ MRI Hip with contrast (arthrogram) (CPT® 73722) • **IN ADDITION TO:** ◦ CT Hip without contrast (CPT® 73700) **OR** ◦ CT Pelvis without contrast (CPT® 72192)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Piriformis Syndrome	NA	• This condition is imaged according to the criteria found in the Peripheral Nerve and Neuromuscular Disorders Guidelines. See **Focal Neuropathy (PN-2)** in the Peripheral Nerve and Neuromuscular Disorders Imaging Guidelines	
Post-Operative	Yes	• Symptomatic individuals following surgery for labral tears and femoroacetabular impingement: ◦ MRI Hip with contrast (arthrogram) (CPT® 73722) • Symptomatic individuals following surgery for hip fracture and/or hip avascular necrosis: ◦ CT Hip without contrast (CPT® 73700) **OR** ◦ MRI Hip without contrast (CPT® 73721)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
Post-Operative Hip Replacement Surgery	No*	• For suspected aseptic loosening of hip replacement when recent plain x-ray is nondiagnostic: ◦ CT Hip without contrast (CPT® 73700) **OR** ◦ Bone scan (CPT® 78315) **OR** ◦ Distribution Of Radiopharma-ceutical Agent SPECT (CPT® 78803 or CPT® 78831) **OR** ◦ Hybrid SPECT/CT (CPT® 78830) • For suspected infection with negative or	See: **Post-Operative Joint Replacement Surgery (MS-16)**

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		inconclusive joint aspiration culture: ◦ MRI Hip without contrast (CPT® 73721) **OR** ◦ MRI Hip without and with contrast (CPT® 73723) **OR** ◦ CT Hip with contrast (CPT® 73701) **OR** ◦ CT Hip without contrast (CPT® 73700)[9] **OR** ◦ US Hip (CPT® 76881 or CPT® 76882) **OR** ◦ See also: **Nuclear Medicine (MS-28)** • For suspicion of a periprosthetic fracture when	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		recent plain x-ray is nondiagnostic: ◦ CT Hip without contrast (CPT® 73700) **OR** ◦ Bone scan (CPT® 78315) **OR** ◦ Distribution Of Radiopharma-ceutical Agent SPECT (CPT® 78803 or CPT® 78831) **OR** ◦ Hybrid SPECT/CT (CPT® 78830) • To evaluate component malposition or heterotopic bone after plain x-ray: ◦ CT Hip without contrast (CPT® 73700)	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		• For possible nerve injury: ◦ MRI Hip without contrast (CPT® 73721) • For suspected tendinitis/bursitis, abductor injury, or other soft tissue abnormality (*requires conservative treatment): ◦ MRI Hip without contrast (CPT® 73721) **OR** ◦ US Hip (CPT® 76881 or CPT® 76882)	

Musculoskeletal Imaging Guidelines

Evidence Discussion (MS-24)

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For most patients with a hip complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. Register et. al. found labral tears in 69% of asymptomatic volunteers. It was also reported that the asymptomatic participants in their study older than 35 years were 13.7 time more likely to have a chondral defect and 16.7 times more likely to have a subchondral cyst compared with participants 35 or younger. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Ganguli et. al. reported incidental findings on screening and diagnostic tests are common and may trigger cascades of further testing and treatment. Also reported was that such cascades of care come with substantial potential for harm (including patient anxiety and additional treatment risks) in addition to monetary costs and inconvenience.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of hip conditions are also recommended by the American College of Radiology Appropriate Use Criteria It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for several hip conditions (e.g. tendonitis, bursitis, generalized hip pain) do not rely on advanced imaging results and many patients will improve within a few weeks or months with conservative care. However, for some hip conditions (e.g. loose bodies, suspected tendon tear, particular issues after hip replacement surgery), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many hip conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Knee (MS-25)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
General Knee Pain	Yes	• MRI Knee without contrast (CPT® 73721) **OR** • US Knee (CPT® 76881 or CPT® 76882)	
Symptomatic Loose Bodies	No	• MRI Knee without contrast (CPT® 73721) **OR** • CT Knee with contrast (arthrogram) (CPT® 73701) if MRI cannot be performed	
Tendonitis	Yes	• MRI Knee without contrast (CPT® 73721) **OR** • US Knee (CPT® 76881 or CPT® 76882)	
Complex Knee Fracture	No	• MRI Knee without contrast (CPT® 73721) **OR** • CT Knee without contrast (CPT® 73700)	See also: **Fractures (MS-5)**

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Meniscus Tear	Yes*	• MRI Knee without contrast (CPT® 73721) **OR** • CT Knee with contrast (arthrogram) (CPT® 73701) if MRI cannot be performed *Conservative treatment is not required if at least 2 of following 4 criteria are met: 1) Positive McMurray's, positive Thessaly, or positive Apley's Compression Test 2) twisting or acute injury of the knee 3) locked knee/inability to fully extend the knee on exam in comparison to the opposite knee 4) knee effusion	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		• MRI Knee without contrast (CPT® 73721) for clinical suspicion of a symptomatic degenerative meniscus tear in an individual with osteoarthritis following conservative treatment	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Ligament Tear	Yes*	• MRI Knee without contrast (CPT® 73721) *Conservative treatment is not required if any of the following signs are positive in comparison to the opposite knee: • Anterior drawer • Lachman • Pivot shift • Posterior drawer • Posterior sag • Valgus stress • Varus stress	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Knee Joint Dislocation	No	• Following significant trauma to evaluate for ligament and vascular injury: ◦ MRI Knee without contrast (CPT® 73721) AND *EITHER* ◦ MR Angiography lower extremity without and with contrast (CPT® 73725) **OR** ◦ CT Angiography lower extremity without and with contrast (CPT® 73706)	
Patellar Dislocation/ Subluxation	No	• MRI Knee without contrast (CPT® 73721) **OR** CT Knee without contrast (CPT® 73700) when there is an acute knee injury, consideration of surgery, **AND** concern for osteochondral fracture or loose osteochondral fracture fragment	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Recurrent Patellar Instability	Yes	• MRI Knee without contrast (CPT® 73721) **OR** CT Knee without contrast (CPT® 73700) if consideration for surgery	
Patellofemoral Pain Syndrome/ Anterior Knee Pain/ Tracking Disorder	Yes	• MRI Knee without contrast (CPT® 73721) **OR** CT Knee without contrast (CPT® 73700) if consideration for surgery	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Suspected Osteochondral Injury	No	• If plain x-rays are negative and an osteochondral fracture is still suspected: ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ MRI Knee with contrast (arthrogram) (CPT® 73722) **OR** ◦ CT Knee with contrast (arthrogram) (CPT® 73701)	See: **Chondral/ Osteochondral Lesions (MS-13)** for other osteochondral injury scenarios.
Avascular Necrosis (AVN) of the Distal Femur	No	• See: **AVN (MS-4.1)**	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Baker's Cyst (Popliteal Cyst)	Yes	• US Knee (CPT® 76881 or CPT® 76882) is the initial imaging study • MRI Knee without contrast (CPT® 73721) for preoperative planning	See also: **Acute Limb Swelling (PVD-12)** in the Peripheral Vascular Disease Imaging Guidelines
Plica (Symptomatic Synovial Plica/ Medial Synovial Shelf)	Yes	• MRI Knee without contrast (CPT® 73721)	
Hemarthrosis (Traumatic)	*See comments	• *See specific trauma-related section (e.g. ligament tear, suspected osteochondral injury, patellar dislocation)	
Hemarthrosis (Non-traumatic or spontaneous)[23,24]	No	• MRI Knee without contrast (CPT® 73721)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Complete Rupture of the Distal Quadriceps Tendon or Patellar Ligament/ Tendon	No	• For preoperative planning: ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ US Knee (CPT® 76881 or CPT® 76882)	
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ US Knee (CPT® 76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/ muscle tears.
Complete Rupture – Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ US Knee (CPT® 76881 or CPT® 76882)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative	Yes	• In symptomatic individuals following surgery for meniscus tears and reconstruction of the anterior cruciate ligament: ◦ MRI Knee with contrast (arthrogram) (CPT® 73722) **OR** ◦ MRI Knee without contrast (CPT® 73721) • In symptomatic individuals following surgery for fracture/dislocation: ◦ CT Knee without contrast (CPT® 73700)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
Post-Operative Knee Replacement Surgery	No*	• For suspected aseptic loosening when recent plain x-ray is nondiagnostic: ◦ CT Knee without contrast (CPT® 73700) **OR** ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ See also: **Nuclear Medicine (MS-28)** • For suspected infection with negative or inconclusive joint aspiration culture: ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ MRI Knee without and with contrast (CPT® 73723) **OR** ◦ CT Knee with contrast (CPT® 73701) **OR** ◦ US Knee (CPT® 76881 or 76882)	See also: **Post-Operative Joint Replacement Surgery (MS-16)**

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		◦ See also: **Nuclear Medicine (MS-28)** • Following plain x-ray for suspected periprosthetic fracture: ◦ CT Knee without contrast (CPT® 73700) **OR** ◦ MRI Knee without contrast (CPT® 73721) ◦ 3-phase bone scan (CPT®78315) • For suspected osteolysis or component instability, rotation, or wear: ◦ CT Knee without contrast (CPT® 73700) **OR** ◦ MRI Knee without contrast (CPT® 73721) • For suspected periprosthetic soft tissue abnormality unrelated to infection (e.g.,	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
		tendinopathy, arthrofibrosis, patellar clunk syndrome, impingement of nerves or other soft tissue) *requires conservative treatment: ◦ MRI Knee without contrast (CPT® 73721) **OR** ◦ US Knee (CPT® 76881 or CPT® 76882)	

Evidence Discussion (MS-25)

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For most patients with a knee complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. It has been reported that approximately 30 – 40 percent of middle-aged patients and an even higher percentage of older patients have asymptomatic meniscus tears. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of knee conditions are also recommended by the American College of Radiology Appropriate Use Criteria. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for many knee conditions does not rely on advanced imaging results and most patients will improve within a few weeks or months with conservative care. However, for some knee conditions (e.g. loose bodies, suspected tendon tear, particular issues after knee replacement surgery), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many knee conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Ankle (MS-26)

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Ankle (MS-26)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
General Ankle Pain	Yes	• MRI Ankle without contrast (CPT® 73721) **OR** • US Ankle (CPT® 76881 or CPT® 76882)	
Symptomatic Loose Bodies	No	• MRI Ankle without contrast (CPT® 73721)	
Complex Fracture	No	• MRI Ankle without contrast (CPT® 73721) **OR** • CT Ankle without contrast (CPT® 73700)	
Ankle Sprain, Including Avulsion Fracture	Yes	• MRI Ankle Without Contrast (CPT® 73721) **OR** • CT Ankle without contrast (CPT® 73700)	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
High Ankle Sprain (Syndesmosis Injury)	No	• MRI Ankle without contrast (CPT® 73721) **OR** • CT Ankle without contrast (CPT® 73700)	
Suspected Osteochondral Injury	No	• If plain x-rays are negative and an osteochondral fracture is still suspected, ONE of the following: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ CT Ankle without contrast (CPT® 73700)	See: **Chondral/ Osteochondral Lesions (MS-13)** for other osteochondral injury scenarios
Avascular Necrosis (AVN) of the Talus	No	• See: **AVN (MS-4.1)**	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Anterior Impingement **Anterior-Lateral Impingement** **Posterior Impingement (e.g., Os Trigonum Syndrome)**	Yes	• MRI Ankle with contrast (arthrogram) (CPT® 73722) **OR** • CT Ankle with contrast (arthrogram) (CPT® 73701) **OR** • MRI Ankle without contrast (CPT® 73721)	
Tendonitis	Yes	• For suspected posterior tibial dysfunction, peroneal tendon or subluxation, Achilles tendonitis: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ US Ankle (CPT® 76881 or CPT® 76882)	
Complete Rupture of Achilles Tendon	No	• For preoperative evaluation: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ US Ankle (CPT® 76881 or CPT® 76882)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Complete Rupture -Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ US Ankle (CPT® 76881 or CPT® 76882)	
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ US Ankle (CPT® 76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/ muscle tears.
Instability	Yes	• For preoperative evaluation: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ MRI Ankle with contrast (arthrogram) (CPT® 73722)	
Charcot Ankle	Yes	• MRI Ankle without contrast (CPT® 73721)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative	Yes	• In symptomatic individuals following surgery for ligament/tendon injuries, *one of the following*: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ US Ankle (CPT® 76881 or CPT® 76882) • For symptomatic individuals following surgery for complex fractures: ◦ CT Ankle without contrast (CPT® 73700)	

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
Post-Operative Ankle Replacement Surgery	No	• For suspected aseptic loosening or periprosthetic fracture when recent plain x-ray is nondiagnostic: ◦ CT Ankle without contrast (CPT® 73700) **OR** ◦ Bone scan (CPT® 78315, 78300, or 78306) **OR** ◦ Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803 or 78831) **OR** ◦ Hybrid SPECT/CT (CPT® 78830) • For suspected infection with negative or inconclusive joint aspiration culture: ◦ MRI Ankle without contrast (CPT® 73721) **OR**	See: **Post-Operative Joint Replacement Surgery (MS-16)**

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced Imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
		◦ MRI Ankle without and with contrast (CPT® 73723) **OR** ◦ CT Ankle with contrast (CPT® 73701) **OR** ◦ US Ankle (CPT® 76881 or CPT® 76882) **OR** ◦ See also: **Nuclear Medicine (MS-28)**	

One Study/Area Only

In foot and ankle advanced imaging, studies are frequently ordered of both areas. This is unnecessary since ankle MRI will image from above the ankle to the mid-metatarsal area. **Only one CPT® code should be reported** .

Musculoskeletal Imaging Guidelines

Evidence Discussion (MS-26)

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For most patients with an ankle complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Ganguli et. al. reported incidental findings on screening and diagnostic tests are common and may trigger cascades of further testing and treatment. Also reported was that such cascades of care come with substantial potential for harm (including patient anxiety and additional treatment risks) in addition to monetary costs and inconvenience.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of ankle conditions are also recommended by the American College of Radiology Appropriate Use Criteria. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for many ankle conditions does not rely on advanced imaging results and most patients will improve within a few weeks or months with conservative care. However, for some ankle conditions (e.g. loose bodies, suspected tendon tear, issues after ankle replacement surgery), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many ankle conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Foot (MS-27)

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Foot (MS-27)

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
General Foot Pain	Yes	• MRI Foot without contrast (CPT® 73718)	
Complex Fractures	No	• CT Foot without contrast (CPT® 73700)	
Plantar Plate Disorders, Including Turf Toe Injuries	Yes	• MRI Foot without contrast (CPT® 73718)	
Sesamoid Disorders	Yes	• MRI Foot without contrast (CPT® 73718) **OR** • CT Foot without contrast (CPT® 73700)	

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Lisfranc Tarsometatarsal Fracture or Dislocation	No	• MRI Foot without contrast (CPT® 73718) **OR** • CT Foot without contrast (CPT® 73700)	
Tarsal Navicular Stress/Occult Fracture	No	• MRI Foot without contrast (CPT® 73718) • Tc-99m bone scan foot (CPT® 78315) if MRI cannot be performed • CT Foot without contrast (CPT® 73700) for follow-up of healing fractures	See also: **Suspected Occult/ Stress/ In-sufficiency Fracture/ Stress Reaction and Shin Splints (MS-5.2)**

Musculoskeletal Imaging Guidelines

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Avascular Necrosis (AVN) of the Tarsal Navicular (Kohler Disease) or Metatarsal Head (Frieberg's Infraction)	No	• See: **AVN (MS-4.1)**	
Tendonitis	Yes	• MRI Foot without contrast (CPT® 73718) **OR** • US Foot (CPT® 76881 or CPT® 76882)	
Complete Rupture – Tear of a Specific Named Tendon	No	• For preoperative planning: ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ US Foot (CPT® 76881 or CPT® 76882)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Partial Tendon Rupture	No	• For a suspected partial tendon rupture of a specific named tendon not otherwise specified: ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ US Foot (CPT® 76881 or CPT® 76882)	MRI is *NOT* needed for muscle belly strains/muscle tears.
Morton's Neuroma	Yes	• For preoperative planning: ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ MRI Foot without and with contrast (CPT® 73720) **OR** ◦ US Foot (CPT® 76881 or CPT® 76882)	
Plantar Fasciitis	Yes*	• For preoperative planning: ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ US Foot (CPT® 76881 or CPT® 76882)	*Provider-directed conservative treatment must be for 6 months or more.

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)	Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)	Comments (Additional comments related to the condition.)
Suspected Plantar Fascia Rupture or Tear	Yes	• MRI Foot without contrast (CPT® 73718) **OR** • US Foot (CPT® 76881 or CPT® 76882)	
Diabetic Foot Infection	No	• For suspected osteomyelitis or soft tissue infection as a complement to plain x-ray (both plain x-ray and advanced imaging are indicated): ◦ MRI Foot without and with contrast (CPT® 73720) **OR** ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ CT foot without contrast (CPT® 73700) **OR** ◦ CT Foot with contrast (CPT® 73701)[13]	See also: **Infection-General (MS-9.1)**

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After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Tarsal Tunnel Syndrome including Baxter's Neuropathy	Yes	• For preoperative planning if mass/lesion is suspected as etiology of entrapment: ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ US Foot (CPT® 76881 or CPT® 76882)	
Tarsal Coalition	Yes	• For preoperative planning: ◦ MRI Ankle without contrast (CPT® 73721) **OR** ◦ CT Ankle without contrast (CPT® 73700)	
Sinus Tarsi Syndrome	Yes	• MRI Ankle without contrast (CPT® 73721) if diagnosis is unclear or for preoperative evaluation	
Charcot Foot	Yes	• MRI Foot without contrast (CPT® 73718) **OR** • MRI Foot without and with contrast (CPT® 73720)	
CRPS Type I	Yes	• Triple phase bone scan (CPT® 78315) OR • MRI Foot without contrast (CPT® 73718)	

After an initial plain x-ray has been obtained, and results are available to the provider, the following advanced imaging is indicated (as described in General Guidelines [MS-1.0])			
Condition (Individual's condition)	**Conservative Treatment (Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required?) (Yes or No)**	**Advanced imaging (The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.)**	**Comments (Additional comments related to the condition.)**
Post-Operative	Yes	• In symptomatic individuals following surgery for conditions including the tendons, ligaments, and plantar plate, ONE of the following: ◦ MRI Foot without contrast (CPT® 73718) **OR** ◦ US Foot (CPT® 76881 or CPT® 76882) • In symptomatic individuals following surgery for complex fractures, sesamoid fractures, and subtalar arthrodesis: ◦ CT Foot without contrast (CPT® 73700)	

One Study/Area Only

In foot and ankle advanced imaging, studies are frequently ordered of both areas. This is unnecessary since ankle MRI will image from above the ankle to the mid- metatarsal area. **Only one CPT® code should be reported.**

Evidence Discussion (MS-27)

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A diagnosis can be made for most patients with a foot complaint based on a detailed history, physical examination and plain x-rays. Advanced imaging is typically not necessary for the initial evaluation. Multiple articles have shown advanced imaging can often demonstrate abnormalities that have no relevance to the patient's symptoms. Advanced imaging incidental findings can possibly lead to overtreatment with referral to specialists and possibly unnecessary surgery. Ganguli et. al. reported incidental findings on screening and diagnostic tests are common and may trigger cascades of further testing and treatment. Also reported was that such cascades of care come with substantial potential for harm (including patient anxiety and additional treatment risks) in addition to monetary costs and inconvenience.

Plain x-rays are valuable as initial imaging as they can determine the necessity of advanced imaging, what specific advanced imaging study is warranted and if contrast is needed. As x-rays often have a larger field of view than MRI or CT, they have the potential to identify more proximal or distal pathology in an extremity. Initial plain x-rays for the evaluation of foot conditions are also recommended by the American College of Radiology Appropriate Use Criteria. It is also noteworthy that when MRI is necessary, radiographs are considered an essential, initial complementary study for the reading of musculoskeletal MRIs.

Treatment for many foot conditions does not rely on advanced imaging results and most patients will improve within a few weeks or months with conservative care. Plantar fasciitis may take up to 12 months of non-operative treatment, however, MRI imaging is rarely needed for treatment planning. It should be noted though, for some foot conditions (e.g. Lisfranc injuries, suspected tendon tear, diabetic foot infections), conservative care would not be necessary prior to advanced imaging.

In addition to overtreatment and possibly unnecessary surgery due to incidental findings, risks of advanced imaging include but are not limited to radiation exposure, implanted device complications, metallic foreign body complications and contrast complications.

For many foot conditions, initial plain x-rays and an initial course of conservative care can provide a significant clinical benefit that would outweigh the clinical harm from perhaps briefly delaying advanced imaging if needed. A course of conservative care or plain x-ray findings many times may obviate the need for advanced imaging which possess their own set of significant risks.

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Musculoskeletal Imaging Guidelines

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Nuclear Medicine (MS-28)

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Nuclear Medicine (MS-28)

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Results of plain x-rays performed after the current episode of symptoms started or changed need to be available to the requesting provider, unless otherwise specified below.

- SPECT scan may be approved for any of the indications for which a bone scan can be approved.
  - If the request is for CPT® 78300 and CPT® 78803, then only CPT® 78803 is to be approved if medical necessity is established.
  - If the request is for CPT® 78305 or CPT® 78306 and CPT® 78803, then two CPT® codes may be approved if medical necessity is established.
- Nuclear Medicine may be used in the evaluation of some musculoskeletal disorders, and other rare indications exist as well.
  - Evaluation of suspected aseptic loosening of orthopedic prostheses when recent plain x-ray is nondiagnostic:
    - Bone scan (CPT® 78315) **OR**
    - Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831) **OR**
    - Hybrid SPECT/CT (CPT® 78830)
    - See also: **Post-Operative Joint Replacement Surgery (MS-16)** and anatomic tables
  - For detection of ischemic or infarcted regions in sickle cell disease:
    - Nuclear medicine bone marrow imaging (CPT® 78102, 78103, or 78104) **OR**
    - SPECT (CPT® 78803) **OR**
    - Hybrid SPECT/CT (CPT® 78830)
    - See also: **Modality General Considerations (PEDMS-1.3)**
  - Evaluation of complex regional pain syndrome or reflex sympathetic dystrophy, after failure of six weeks provider-directed conservative treatment (per **General Guidelines [MS-1.0]**):
    - Triple phase bone scan (CPT® 78315)
    - See: **Foot (MS-27)** for imaging criteria of CRPS of the foot
  - Evaluation of Paget's disease
    - Bone scan (CPT® codes: 78300, 78305, or 78306) **OR**
    - Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) **OR**
    - Hybrid SPECT/CT (CPT® 78830)
    - See also: **Soft Tissue Mass or Lesion of Bone (MS-10)**
  - Suspected fractures

        - If criteria per **Suspected Occult/Stress/Insufficiency Fracture/Stress Reaction and Shin Splints (MS-5.2)** *(excluding peri-prosthetic fractures)* are met, but MRI cannot be performed:
            - Tc-99m bone scan whole-body (CPT® 78306) with SPECT of the area of interest (CPT® 78803) **OR**
            - Hybrid SPECT/CT (CPT® 78830) **OR**
            - Bone scan (CPT® 78315, 78305, or 78300)

          AND
        - For ***peri-prosthetic fractures*** when MRI cannot be performed:
            - Tc-99m bone scan whole-body (CPT® 78306) with SPECT of the area of interest (CPT® 78803) **OR**
            - Hybrid SPECT/CT (CPT® 78830) **OR**
            - Bone scan (CPT® 78315, 78305, or 78300)
    - Evaluation of suspected bone infection if MRI or CT cannot be done and when infection is multifocal, or when the infection is associated with orthopedic hardware or chronic bone alterations from trauma or surgery
        - FDG PET/CT (CPT® 78815 for multifocal infection, or CPT® 78811 for unifocal/limited area of interest) if MRI or CT is equivocal or cannot be done
            - At this time, FDG is the only indicated radiotracer for use with PET/CT in the imaging of musculoskeletal conditions.
        - Bone scan (CPT® 78315, 78300, 78305, or 78306) **OR**
        - Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803 or 78831) **OR**
        - Hybrid SPECT/CT (CPT® 78830 or 78832)
        - A labeled leukocyte scan (radiopharmaceutical inflammatory imaging - one of CPT® codes: 78800, 78801, 78802, or 78803) in concert with Tc-99m sulfur colloid marrow imaging (one of CPT® codes: 78102, 78103, or 78104)
        - See also: **Post-Operative Joint Replacement Surgery (MS-16)**
        - For specific joints post-operative from replacement surgery:
            - See: **Shoulder (MS-19)**
            - See: **Elbow (MS-20)**
            - See: **Wrist (MS-21)**
            - See: **Hip (MS-24)**
            - See: **Knee (MS-25)**
            - See: **Ankle (MS-26)**

Evidence Discussion (MS-28)

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In most patients with a musculoskeletal complaint, a diagnosis can be made based on a detailed history, physical examination and plain radiographs. X-rays can determine whether an advanced diagnostic imaging study is actually needed, what specific advanced diagnostic imaging study is warranted and if contrast is needed.

MRI and or CT are the study of choice if x-rays are non-diagnostic or equivocal. MRI may be as sensitive as nuclear medicine scans but also considerably more specific. Given the risk of radiation from nuclear medicine imaging it is important to carefully select the proper patient indication. Based on American College of Radiology Appropriateness Criteria for bone pathology and also supported by literature, nuclear medicine is used infrequently but is supported for the following musculoskeletal indications:

- Evaluation of suspected aseptic loosening of orthopedic prostheses when recent plain x-ray is non-diagnostic. Bone Scan SPECT or SPECT/CT are not the initial imaging modalities but may be used as an adjunct in cases where the MRI or CT show metal artifact or equivocal findings.
- Evaluation of suspected bone infection following a x-ray and if MRI or CT cannot be done and when infection is multifocal, or when the infection is associated with orthopedic hardware or chronic bone alterations from trauma or surgery. SPECT/CT or SPECT bone scan imaging along with SPECT/CT or SPECT labeled leukocyte imaging are the most sensitive nuclear studies for bone or hardware infection.
- Suspected Occult/Stress/Insufficiency Fracture/Stress Reaction and Shin Splints with negative x-ray and MRI cannot be performed, bone scan can be performed with SPECT or SPECT/CT or Three phase bone scan.
- Evaluation of complex regional pain syndrome or reflex sympathetic dystrophy, after failure of six weeks provider-directed conservative treatment (per General Guidelines [MS-1.0]): - Triple phase bone scan (CPT® 78315) is indicated.
- For detection of ischemic or infarcted regions of bone. The first imaging study is a X-ray. The next study of choice is MRI without contrast. Bone scan is rarely useful when MRI cannot be done.

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