National Imaging Associates, Inc.	
Clinical guidelines **UPPER EXTREMITY CT** **(Hand, Wrist, Elbow, Long bone, or Shoulder CT)**	**Original Date: September 1997**
CPT Codes: 73200, 73201, 73202	**Last Revised Date: May 2023~~March 2022~~**
Guideline Number: NIA_CG_057-1	**Implementation Date: January 2024~~3~~**

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

INDICATIONS FOR UPPER EXTREMITY CT (HAND, WRIST, ARM, ELBOW, OR SHOULDER) (Plain radiographs must precede CT evaluation)

Some indications are for MRI, CT, or MR or CT Arthrogram. More than one should not be approved at the same time.

If a CT Arthrogram fits approvable criteria below, approve as CT.

Joint or muscle pain without positive findings on an orthopedic exam as listed above, after x-ray completed[1,2] (does not apply to young children). If MRI contraindicated or cannot be performed or requested as a CT ~~arthogram~~arthrogram.

- Persistent joint or musculotendinous pain unresponsive to conservative treatment*, within the last 6 months which includes active medical therapy (physical therapy, chiropractic treatments, and/or physician-supervised exercise**), of at least four (4) weeks, **OR**

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- With progression or worsening of symptoms during the course of conservative treatment

Joint specific provocative orthopedic examination and MRI is contraindicated or cannot be performed or requested as a CT ~~arthogram~~arthrogram

Note: With a positive orthopedic sign, an initial x-ray is always preferred. However, it is not required to approve advanced imaging. Any test that suggests joint instability requires further imaging (list is not all inconclusive)

Shoulder[3-6]

- Rotator cuff weakness on exam
- Subscapularis tendon tear
  - Belly press off test
  - Napoleon test
  - Bear Hug test
  - Internal rotation lag
  - ~~Shoulder[1-4]~~
  - ~~Any positive test listed~~
  - ~~Rotator cuff weakness[5]~~
  - ~~Bear hug test~~
  - ~~Belly press test~~
  - ~~Drop arm test~~
  - ~~Full can test~~
  - Lift-off test
- Supraspinatus tendon tear
  - Drop Arm
  - Full Can test
  - Empty Can (aka Jobe or Supraspinatus test)
  - Hawkins or Neer test[7] (only when ordered by an orthopedic surgeon if there is clear documentation in the records that an actual rotator cuff tear is suspected, and NOT just for the evaluation of impingement)
- Infraspinatus / ~~-~~Teres Minor / Biceps tendon tear
  - External rotation lag sign at 0 and 90 degrees
  - Pain or weakness with resisted external rotation testing
  - Hornblower test
  - Popeye sign (if acute finding or for evaluation of surgical correction)
- Labral tear/ Instability
  - Grind test
  - Clunk test
  - Crank test, Compression-rotation test
  - O'Brien's test

- Anterior load and shift
- Apprehension test
- Posterior load and shift test
- Jerk Test
- Sulcus sign

Elbow[8, 9]

- Biceps tendon
  - Bicipital aponeurosis (BA) flex test
  - Biceps squeeze test
  - Hook test
  - Passive forearm pronation test
  - Reverse Popeye sign (if acute finding or for evaluation of surgical correction)
- Instability
  - Posterolateral rotatory drawer test
  - Tabletop relocation test
    - Valgus stress
    - Varus stress
    - Milking maneuver
    - Push-up test

Wrist[10, 11]

- Lunotriquetral ligament~~Hornblower's sign~~
- ~~Internal rotation lag sign~~
- ~~Supraspinatus test (aka Empty Can Test) when positive because of weakness~~
- ~~Elbow[6,7]~~
- ~~Any positive test listed~~
- ~~Valgus stress~~
- ~~Varus stress~~
- ~~Posterolateral rotatory drawer test~~
- ~~Milking maneuver~~
- ~~Push-up test~~
- ~~Popeye sign~~
- ~~Wrist[8,9]~~
- ~~Any positive test listed~~
- ~~Watson test (scaphoid shift test)~~
- ~~Scapholunate ballottement test~~
- ~~Reagan test (lunotriquetral ballottement test)~~
- ~~Snuff box pain (after initial x-ray)~~

- ~~**Joint or muscle pain without positive findings on an orthopedic exam as listed above,** after x-ray completed and an MRI is contraindicated or cannot be performed[10,11] (does not apply to young children)~~
- ~~Persistent joint or musculotendinous pain unresponsive to conservative treatment*, within the last 6 months which includes active medical therapy (physical therapy, chiropractic treatments, and/or physician-supervised exercise**) of at least four (4) weeks; **OR**~~
- ~~With progression or worsening of symptoms during the course of conservative treatment~~
-
    - Derby Relocation test
    - Reagan test (lunotriquetral ballottement test)
- TFCC tear
    - Press test
    - Ulnar foveal sign/test
    - Ulnocarpal stress test
- Scaphoid ligament
    - Watson test (scaphoid shift test)
    - Scapholunate ballottement test

Tendon or Muscle Rupture after x-ray[12-14] (not listed above) If MRI contraindicated or cannot be performed.

- High clinical suspicion of a specific tendon rupture based on mechanism of injury and physical findings (~~i.e.~~i.e., triceps or pectorals tendon rupture)
    - ~~High clinical suspicion of a specific tendon rupture based on mechanism of injury and physical findings (i.e. triceps or pectorals tendon rupture)Clinical suspicion of injury with clinical findings, which may be nonspecific, based on mechanism of injury, x-ray completed, and MRI is contraindicated or cannot be performed~~

~~TFCC (triangular fibrocartilage complex) injury[12,13]~~

~~SLAP (superior labral anterior to posterior complex) lesions[4]~~

Shoulder Dislocations[15, 16] If MRI contraindicated or cannot be performed unless requested as CT ~~arthogram~~arthrogram or to evaluate glenoid bone stock or size of Hill- Sachs lesion.

- Recurrent
- First time in any of the situations below that increase the risk or repeated dislocation
    - Glenoid or humeral bone loss on x-ray
    - Bankart lesion on radiographs
    - ~~14-40 year-old~~14 – 40-year-old
    - > 40 with exam findings concerning for rotator cuff tear (i.e., weakness on exam)

Bone Fracture (If MRI contraindicated or cannot be performed)

- Suspected occult scaphoid fracture with snuffbox pain after initial x-ray
- Non scaphoid suspected occult, stress or insufficiency fracture with a negative initial x-ray[17-19]
    - Repeat x-rays in 10-14 days if negative or non-diagnostic
- Pathologic fracture on x-ray or CT[20]
- Suspected ligamentous/tendon injury with known fractures on x-ray/CT that may require surgery

Fracture Nonunion

- Nonunion or delayed union as demonstrated by no healing between two sets of x-rays. If a fracture has not healed by 4-6 months, there is delayed union. Incomplete healing by 6-8 months is nonunion.[21]

~~14-35 year-old competitive contact sport athlete~~
Osteochondral Lesions (defects, fractures, osteochondritis dissecans) and x-ray completed[22-25]

- Clinical suspicion based on mechanism of injury and physical findings

Loose bodies or synovial chondromatosis and after x-ray or ultrasound completed

- In the setting of joint pain or mechanical symptoms [26]

Osteonecrosis (e.g., Avascular necrosis (AVN~~)~~)[27-29] when MRI is contraindicated or cannot be preformed

- To further characterize a prior abnormal x-ray
- Normal x-rays but symptomatic and high-risk (e.g., glucocorticosteroid use, renal transplant recipient, glycogen storage disease, alcohol abuse,27 sickle cell anemia28)
- Known osteonecrosis to evaluate a contralateral joint after initial x-rays

Joint prosthesis/replacement

- Suspected joint prosthesis loosening or dysfunction, (i.e. pseudotumor formation) after initial x-rays [30, 31]

Extremity Mass[32]

- Mass or lesion after non-diagnostic x-ray or ultrasound[33] ~~14~~ MRI preferred. CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI[34]
    - If superficial mass, then ultrasound is the initial study
    - If deep mass, then x-ray is the initial study
- Vascular malformations

- After initial evaluation with ultrasound and results will change management or for preoperative planning[35]
  - CTA is also approvable for initial evaluation
  - ~~Follow up after treatment/embolization~~
  - ~~Extremity Mass~~
  - ~~Mass or lesion after non-diagnostic x-ray or ultrasound[16]~~
  - ~~If superficial, then ultrasound is the initial study~~
  - ~~If deep, then x-ray is the initial study~~
  - ~~CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI[17]~~
  - ~~If there is a contraindication to MRI~~
  -

Known Primary Cancer of the Extremity[36-40]

- Initial ~~Cancer~~ staging primary extremity tumor
- Follow-up of known primary cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer
- ~~Cancer restaging~~
- Signs or symptoms or imaging findings ~~of~~ suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with radiographs

Further evaluation of indeterminate or questionable findings on prior imaging and MRI cannot be performed or CT is preferred (i.e., tumor matrix)~~:~~

- For initial evaluation of an inconclusive finding on a prior imaging report (~~i.e~~i.e., x-ray, ultrasound or MRI) that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam).

Infection of Bone ~~or~~, Joint or Soft tissue abscess[41, 42]

MRI and nuclear medicine studies are recommended for acute infection as they are more sensitive in detecting early changes of osteomyelitis.[43] CT is better at demonstrating findings of chronic osteomyelitis (sequestra, involucrum, cloaca, sinus tracts) as well as detecting soft tissue gas and foreign bodies.[44]

- Abnormal x-ray or ultrasound
- Negative x-ray but with a clinical suspicion of infection
  - Signs and symptoms of joint or bone infection include:
    - Pain and swelling

        - Decrease range of motion
        - Fever
    - Laboratory findings of infection include any of the following:
        - Elevated ESR or CRP
        - Elevated white blood cell count
        - Positive joint aspiration
- Ulcer (diabetic, pressure, ischemic, traumatic) with signs of infection (redness, warm, swelling, pain, discharge which may range from white to serosanguineous) that is not improving despite treatment and ~~bone~~bone, or deep infection is suspected
    - Increased suspicion if size or temperature increases, bone is exposed/positive probe-to-bone test, new areas of breakdown, new smell[45]

Pre-operative/procedural evaluation:

- Pre-operative evaluation for a planned surgery or procedure

Post-operative/procedural evaluation:

- When imaging, physical, or laboratory findings indicate joint infection, delayed or non-healing, or other surgical/procedural complications

~~**Osteonecrosis (Avascular necrosis (AVN))** [MRI is contraindicated or cannot be performed][28, 31~~

- ~~Abnormal x-ray~~
- ~~Normal or indeterminate x-rays but symptomatic and high-risk (e.g., glucocorticosteroid use, renal transplant recipient, glycogen storage disease, alcohol abuse,[32] sickle cell anemia[33])~~

Inflammatory Arthropathy (e.g., rheumatoid arthritis) and MRI is contraindicated or cannot be performed[46, 47]

- Further evaluation of an abnormality or non-diagnostic findings on prior imaging
- Initial imaging of a single joint for diagnosis or response to therapy after plain films and appropriate lab tests (e.g., RF, ANA, CRP, ESR)
- To determine change in treatment or when diagnosis is uncertain prior to start of treatment
- Follow-up to determine treatment efficacy in the following:
    - Early rheumatoid arthritis
    - Advanced rheumatoid arthritis if x-ray and ultrasound are equivocal or noncontributory

Known or suspected inflammatory myopathies (If MRI contraindicated or cannot be performed): (Includes polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis)[48, 49]

- For diagnosis

- For biopsy planning

Crystalline Arthropathy

- Dual-energy CT can be used to characterize crystal deposition disease (i.e. gout) after
  - Appropriate rheumatological work up and initial x-rays AND
  - After inconclusive joint aspiration or when joint aspiration cannot be performed OR[50]
  - In the setting of extra-articular crystal deposits (i.e., tendons or bursa)

~~**Crystalline Arthropathy**~~

- ~~Dual-energy CT can be used to characterize crystal deposition disease, such as gout versus CPPD[36]~~

~~**Bone Fracture or Ligament Injury**~~

- ~~Suspected stress or insufficiency fracture with a negative initial x-ray[37,38]~~
  - ~~Repeat x-rays in 10-14 days if negative or non-diagnostic.~~
- ~~Intraarticular fractures or carpal bone fractures or instability that may require surgery[39]~~
- ~~Suspected scaphoid fracture with negative x-ray~~
- ~~Other upper extremity fractures that may require surgery~~
- ~~Nonunion or delayed union as demonstrated by no healing between two sets of x-rays. If a fracture has not healed by 4-6 months, there is delayed union. Incomplete healing by 6-8 months is nonunion[40,41]~~
- ~~Clinical suspicion based on mechanism of injury and physical findings, x-ray completed and MRI contraindicated~~
  - ~~TFCC (triangular fibrocartilage complex) injury[12,13]~~
  - ~~SLAP (superior labral anterior to posterior complex) lesions[4]~~

  ~~Note: Imaging approvable in the setting of known trauma; otherwise, active conservative therapy is recommended (see background).~~

~~**Osteochondral lesions** (defects, fractures, osteochondritis dissecans) and x-ray completed[42-45]~~

- ~~Clinical suspicion based on mechanism of injury and physical findings~~
- ~~Loose bodies or synovial chondromatosis seen on x-ray or ultrasound~~
- ~~In the setting of joint pain[46]~~

Foreign Body[51]

- Indeterminate x-ray and ultrasound

~~**Tendon or Muscle Rupture after x-ray** and MRI is contraindicated or cannot be performed[48-50]~~

- ~~Clinical suspicion based on mechanism of injury and physical findings (i.e., Popeye, Hook, Yergasons sign)~~

Peripheral Nerve Entrapment (e.g., carpal tunnel) and MRI is contraindicated or cannot be performed, including any of the following[52-56]:

- Abnormal electromyogram or nerve conduction study
- Abnormal x-ray or ultrasound
- Clinical suspicion and failed 4 weeks conservative treatment including at least two of the following (active treatment with physical therapy is not required):
    - Activity modification
    - Rest, ice, or heat
    - Splinting or orthotics
    - Medication

Brachial Plexopathy and MRI is contraindicated or cannot be performed[57, 58]

- If mechanism of injury or EMG/NCV studies are suggestive
- Chest ~~MRI~~ CT is preferred study, but neck and/or shoulder (upper extremity) ~~MRI~~ CT can be ~~ordered~~ approved depending on the suspected location of injury

~~**Pre-operative/procedural evaluation:**~~

- ~~Pre-operative evaluation for a planned surgery or procedure~~

~~**Post-operative/procedural evaluation:**~~

- ~~When imaging, physical, or laboratory findings indicate joint infection, delayed or non-healing, or other surgical/procedural complications~~
- ~~Joint prosthesis loosening or dysfunction, x-rays non-diagnostic[58,59]~~

Pediatrics

- Osteoid Osteoma after an x-ray is done[59]

~~**Note**: Any test that suggest joint impingement or instability requires further imaging (list is not all inconclusive)~~

~~*Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines, and state/national recommendations.*~~

BACKGROUND

Computed tomography (CT) may be used for the diagnosis, evaluation, and management of conditions of the hand, wrist, elbow, and shoulder. CT is not usually the initial imaging test, but

it is performed after standard radiographs. CT is used for preoperative evaluation or to evaluate specific abnormalities of the bones, joints, and soft tissues of the upper extremities.

OVERVIEW

***Conservative Therapy** – (Musculoskeletal) should include a multimodality approach consisting of a combination of active and inactive components. Inactive components, such as rest, ice, heat, modified activities, medical devices, (including crutches, immobilizer, metal braces, orthotics, rigid stabilizer, or splints, etc. and not to include neoprene sleeves), medications, injections (bursal, and/or joint, not including trigger point), and diathermy, can be utilized. Active modalities may consist of physical therapy, a physician-supervised home exercise program**, and/or chiropractic care.

****Home Exercise Program - (HEP)** – The following two elements are required to meet guidelines for completion of conservative therapy:

- Information provided on exercise prescription/plan AND
- Follow-up with member with information provided regarding completion of HEP (after suitable 4-week period), or inability to complete HEP due to physical reason- i.e., increased pain, inability to physically perform exercises. (Patient inconvenience or noncompliance without explanation does not constitute "inability to complete" HEP).

~~**Joint Implants and Hardware –** Dual-energy CT may be useful for metal artifact reduction if available, but it is also imperfect as the correction is based on a projected approximation of x-ray absorption and does not correct for scatter.[60] Dual-energy CT can be used to characterize crystal deposition disease, such as gout versus CPPD.[36]~~

~~**CT to Evaluate Shoulder Pain –** The initial work-up for chronic shoulder pain includes plain radiographs. When the diagnosis remains unclear, further testing including may include computed tomography. CT is the preferred imaging technique for evaluating bony disorders of the shoulders, e.g., arthritis, tumors, occult fractures. CT may be useful in patients with suspected rotator cuff tears who cannot undergo magnetic resonance imaging (MRI).~~

Shoulder Dislocation – Glenoid bone loss occurs in anterior shoulder dislocation. Severe degrees of glenoid bone loss are shown on axial radiography, but it can be quantified more definitively using CT. This information is important as it helps to predict the likelihood of further dislocation and the need for bone augmentation surgery. The number of dislocations cannot reliably predict the degree of glenoid bone loss; it is important to quantify glenoid bone loss, initially by arthroscopy and later by CT. ~~In the CT examination, both glenoids can be examined simultaneously, resulting in a comparison of the width of the glenoid in the dislocating shoulder and in the non-dislocating shoulder.~~

Shoulder fractures – CT may be used to characterize shoulder fractures when more information is needed preoperatively. CT can show the complexity of the fracture, the displacement, and angulation.

CT and Wrist Fractures – CT is indicated for wrist fractures where there is fracture comminution, displacement, or complex intraarticular extension. CT can provide a detailed evaluation of radiocarpal articular step-off and gap displacement which can predict the development of radiocarpal osteoarthritis. CT can be performed in several planes, providing soft-tissue and bone detail. CT is also useful in determining the position of known fracture fragments and in assessing the union or status of fracture healing.

CT for Preoperative Evaluation – Where more information is needed preoperatively, CT is used to demonstrate fracture complexity, displacement, and angulation.

CT and Scaphoid Fractures – CT is accurate in depicting occult cortical scaphoid fractures. It may be used as a second-choice diagnostic method when patients are clinically suspected of having a scaphoid fracture, but radiographs are negative or equivocal. Usually, the diagnosis of a scaphoid fracture of the wrist is based upon clinical presentation and conventional radiographs. However, a large percentage of patients with a high clinical probability of a scaphoid fracture have unremarkable radiographs. Multidetector CT allows coverage of the whole wrist with excellent spatial resolution. It has been proven to be superior to MRI in the detection of cortical involvement of occult scaphoid fractures.

CT and Avascular Necrosis Complicating Chronic Scaphoid Nonunion – Preoperative CT of a scaphoid nonunion may be helpful in identifying avascular necrosis and predicting subsequent fracture union. If the results of CT suggest avascular necrosis, treatment options may include vascularized bone grafts or limited wrist arthrodesis.

CT and Posttraumatic Elbow Effusions – Multidetector computed tomography (MDCT) may help to detect occult fractures of the elbow when posttraumatic elbow effusions are shown on radiographs without any findings of fracture. Effusions may be visualized on radiographs as fat pads, which can be elevated by the presence of fluid in the joint caused by an acute fracture. MDCT may be useful when effusions are shown on radiographs without a visualized fracture, but there is a clinical suspicion of a lateral condylar or radial head fracture.

CT and Avascular Necrosis – Sports, such as racquetball and gymnastics, may cause repeated microtrauma due to the compressive forces between the radial head and capitellum. Focal avascular necrosis and osteochondritis dissecans of the capitellum may result. CT may show the extent of subchondral necrosis and chondral abnormalities. The images may also help detect intraarticular loose bodies.

CT and Acute Osseous Trauma – Many elbow injuries result from repetitive microtrauma rather than acute trauma and the injuries are sometimes hard to diagnose. Non-displaced fractures are not always evident on plain radiographs. When fracture is suspected, CT may improve diagnostic specificity and accuracy.

CT and Wrist Tumor – Osteoma does not often occur in the wrist. Symptoms may resemble atypical tenosynovitis. Pain may seem to be related to an injury. CT, however, may be used to evaluate a suspected tumor and may visualize a round lucency surrounded by a rim of sclerosis. CT can give details about the location of the tumor, relative to joints.

Upper Extremity Osteomyelitis and Septic Arthritis – CT helps to distinguish among the types of musculoskeletal infections. Its specific imaging features help identify the forms of infection in the bones and soft tissue. Osteomyelitis, a bone infection most commonly associated with an open fracture or direct trauma, is often not detected in the initial conventional radiographic evaluation because bone changes are not evident for 14-21 days after the onset of infection. CT is also used to help diagnose septic arthritis; CT features include joint effusion and bone erosions around the joint.

Adhesive Capsulitis a.k.a. Frozen Shoulder[61-63] – MRI is the preferred modality for imaging after a failure of improvement with active conservative therapy. Affected patients have impaired range of shoulder motion with forward flexion, abduction, and external and internal rotation which may be associated with pain. Clinically, it can be distinguished from rotator cuff pathology where passive range of motion is preserved, or neoplasm which may also have associated fever or weight loss. Treatment is with a combination of intracapsular steroid injection and active conservative care. Anti-inflammatory medications are also given to facilitate active treatment. When nonsurgical management, including anti-inflammatory medication, active care (physical therapy, a supervised home exercise program or manipulations), and injections, have failed to provide relief of symptoms by 9 to 12 months, surgical intervention is indicated, but this represents the minority of patients.

Shoulder Impingement, Non-Traumatic Shoulder Instability, and Glenoid Labral tears – require active conservative therapy* and x-ray (orthopedic signs listed below):

- Shoulder Impingement – Hawkin's, Neer's, Painful arc, Load and shift, and Yocum tests
- Non-Traumatic Shoulder Instability – Sulcus, Surprise, Anterior or Posterior draw, Apprehension, Anterior slide, Clunk, Crank, Empty can, HERI (hyperextension-internal rotation) tests
- Glenoid labral tear (i.e., SLAP lesion) – Apprehension, Relocation, Surprise, Jobe's, O'Brien's, Superior labral, Anterior slide, Jerk, Compression rotation, Crank tests

American Academy of Pediatrics "Choosing Wisely" Guidelines advise against ordering advanced imaging studies (MRI or CT) for most musculoskeletal conditions in a child until all appropriate clinical, laboratory and plain radiographic examinations have been completed. **"**History, physical examination, and appropriate radiographs remain the primary diagnostic modalities in pediatric orthopedics, as they are both diagnostic and prognostic for the great majority of pediatric musculoskeletal conditions. Examples of such conditions would include, but not be limited to, the work up of injury or pain (spine, knees, and ankles), possible infection, and deformity. MRI examinations and other advanced imaging studies frequently require sedation in the young child (5 years old or less) and may not result in appropriate interpretation if clinical correlations cannot be made. Many conditions require specific MRI sequences or protocols best ordered by the specialist who will be treating the patient… if you believe findings warrant additional advanced imaging, discuss with the consulting orthopedic surgeon to make sure the optimal studies are ordered."[60]

~~**POLICY HISTORY**~~

~~Date~~	~~Summary~~
	~~Updated orthopedic signs~~ ~~Updated references~~ ~~Modified background sections~~ ~~Modified dual energy CT~~ ~~Added known AVN to evaluate contralateral side~~ ~~Added vascular malformations~~ ~~Added indeterminate findings on prior imaging and follow up surveillance~~
~~March 2022~~	• ~~Simplified orthopedic sign section to include only the most robust signs and removed Table 1~~ • ~~Clarified the Supraspinatus Test~~ • ~~Moved the section on shoulder impingement, non-traumatic shoulder instability and glenoid labral tears to the background information section~~ • ~~Expanded Bone or Ligament Injury section to include triangular fibrocartilage injury and superior labral anterior to posterior complex lesions when MRI cannot be done~~ • ~~Removed occult wrist ganglion section~~ • ~~Added Snuff box pain after initial x-ray to wrist section and Popeye sign to elbow section~~
~~May 2021~~	• ~~Additional signs for rotator cuff tear that are considered useful~~ • ~~Removed signs for impingement, shoulder instability and glenoid labral tear since active conservative therapy should be done first~~

	• ~~Added section about impingement, nontraumatic shoulder instability and glenoid labral tear requiring active conservative therapy~~ • ~~Added the following information: shoulder dislocation, suspected bone infection in the setting of ulcers and neuropathy, brachial plexopathy~~
~~May 2020~~	• ~~Expanded the list of orthopedic signs and Added note: With a positive orthopedic sign, an initial x-ray is always preferred. However, it is not required to approve advanced imaging.~~ • ~~Added information about adhesive capsulitis~~ • ~~Clarified that if an CT Arthrogram fits approvable criteria, approve as CT.~~ • ~~Revised the information about an evaluation of an extremity mass.~~ • ~~Expanded information about osteomyeltis~~ • ~~Added information about crystalline arthropathy and dual energy CT~~ • ~~Added information about nonunion/delayed union~~ • ~~Included loose bodies or synovial chondromatosis~~
~~May 2019~~	• ~~Added initial statement about approvals: 'Some indications are for MRI, CT, or MR or CT Arthrogram. More than one should not be approved at the same time'.~~ • ~~Expanded Extremity mass indications including adenopathy; and mass with increased risk for malignancy~~ • ~~Modified Known Cancer indication to be more broad – 'cancer staging, cancer restaging, signs or symptoms of recurrence'~~ • ~~Expanded sections for bone fracture and infection of bone or joint to include list of signs or symptoms and laboratory findings (elevated ESR or CRP, elevated white blood cell count, positive joint aspiration)~~

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POLICY HISTORY

Date	Summary
May 2023	• Updated orthopedic signs • Modified background sections • Modified dual energy CT • Added known AVN to evaluate contralateral side • Added vascular malformations • Added indeterminate findings on prior imaging and follow up surveillance • Added Popeye sign and Reverse Popeye sign • Updated References • Removed Additional Resources • Added statement regarding clinical indications not addressed in the guideline. • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline
March 2022	• Simplified orthopedic sign section to include only the most robust signs and removed Table 1 • Clarified the Supraspinatus Test • Moved the section on shoulder impingement, non-traumatic shoulder instability and glenoid labral tears to the background information section • Expanded Bone or Ligament Injury section to include triangular fibrocartilage injury and superior labral anterior to posterior complex lesions when MRI cannot be done • Removed occult wrist ganglion section • Added Snuff box pain after initial x-ray to wrist section and Popeye sign to elbow section
~~May 2021~~	~~• Additional signs for rotator cuff tear that are considered useful~~ ~~• Removed signs for impingement, shoulder instability and glenoid labral tear since active conservative therapy should be done first~~ ~~• Added section about impingement, nontraumatic shoulder instability and glenoid labral tear requiring active conservative therapy~~

	~~Added the following information: shoulder dislocation, suspected bone infection in the setting of ulcers and neuropathy, brachial plexopathy~~
~~May 2020~~	~~Expanded the list of orthopedic signs and Added note: With a positive orthopedic sign, an initial x-ray is always preferred. However, it is not required to approve advanced imaging.~~ ~~Added information about adhesive capsulitis~~ ~~Clarified that if an CT Arthrogram fits approvable criteria, approve as CT.~~ ~~Revised the information about an evaluation of an extremity mass.~~ ~~Expanded information about osteomyeltis~~ ~~Added information about crystalline arthropathy and dual energy CT~~ ~~Added information about nonunion/delayed union~~ ~~Included loose bodies or synovial chondromatosis~~
~~May 2019~~	~~Added initial statement about approvals: 'Some indications are for MRI, CT, or MR or CT Arthrogram. More than one should not be approved at the same time'.~~ ~~Expanded Extremity mass indications including adenopathy; and mass with increased risk for malignancy~~ ~~Modified Known Cancer indication to be more broad – 'cancer staging, cancer restaging, signs or symptoms of recurrence'~~ ~~Expanded sections for bone fracture and infection of bone or joint to include list of signs or symptoms and laboratory findings (elevated ESR or CRP, elevated white blood cell count, positive joint aspiration)~~

~~**Reviewed / Approved by NIA Clinical Guideline Committee**~~

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~~**GENERAL INFORMATION**~~

~~It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.~~

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