Evolent Clinical Guideline ~~057-1~~2062 for Upper Extremity Computed Tomography (CT)

Arm, Carpal Joint, Hand, Scapula, Shoulder, Upper Extremity, Wrist

Guideline ~~or Policy~~ Number: Evolent_CG_~~057-1~~2062	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. ***© 1997 - 2026~~5~~ All rights Reserved***		
Original Date: September 1997	**Last Revised Date:** June ~~May~~ 2025~~4~~	**Implementation Date:** January 2026~~5~~

TABLE OF CONTENTS

STATEMENT

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.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

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 X-rays.~~radiographs.~~ CT may be used for preoperative evaluation or to evaluate specific abnormalities of the bones, joints, and soft tissues of the upper extremities.

Special Notes

- ~~Plain radiographs~~X-rays must precede CT evaluation, unless otherwise indicated
- Some indications are for magnetic resonance imaging (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
- When specifically indicated below, MRI is the preferred study for the evaluation of the extremities and CT is indicated only when MRI is contraindicated or cannot be performed

~~MRI is usually the preferred study~~

INDICATIONS FOR UPPER EXTREMITY CT (SHOULDER, ELBOW, OR WRIST)

~~Joint or Muscle~~Upper Extremity Pain (1,2)~~(1,2)~~

NOTE: Prior completed X-ray showing no clear etiology of joint/extremity pain must precede upper extremity CT evaluation unless otherwise indicated

~~**Negative Findings on Orthopedic Exam and after X-Ray Completed**~~

~~**NOTE: Does not apply to young children (up to age 12). If MRI is contraindicated or cannot be performed, or requested as a CT arthrogram**~~

Non-specific Upper Extremity Pain

If MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

Upper extremity pain with no specific joint identified with prior X-ray showing no clear etiology of joint/extremity pain with any **ONE** of the following:

- Persistent joint or musculotendinous upper extremity pain unresponsive to **ACTIVE Conservative Therapy**~~**Conservative Therapy**~~ **(ACT)** which includes physical therapy, chiropractic treatments, and/or physician supervised **Home Exercise Program (HEP)**~~**Home Exercise Program (HEP)**~~ of at least four (4) weeks duration within the last 6 months
- With progression or worsening of symptoms during the course of active conservative treatment
- Pediatric patient that is either under the age of 12 years **OR** cannot comply with the prescribed therapy

Joint Specific Pain or Suspected Joint Specific Injury

If MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

In the absence of a positive joint specific orthopedic sign on exam (see list below), advanced imaging is indicated with prior X-ray showing no clear etiology for the joint pain with any **ONE** of the following:

- Persistent joint pain unresponsive to **ACTIVE Conservative Therapy**~~**Conservative Therapy conservative therapy***~~ **(ACT)** which includes physical therapy, chiropractic treatments, and/or physician supervised **Home Exercise Program (HEP)**~~**Home Exercise Program (HEP)**~~~~home exercise program (HEP)~~ of at least four (4) weeks duration within the last 6 months
- With progression or worsening of symptoms during the course of active conservative treatment
- Pediatric patient that is either under the age of 12 years **OR** cannot comply with the prescribed therapy

Joint Specific Orthopedic Signs

~~Provocative Exam Tests and Suspected Injuries~~

~~**NOTE**: when MRI is contraindicated or cannot be performed, or requested as a CT arthrogram~~

NOTE: With a positive orthopedic sign from the list below, an initial X-ray is always preferred; however, it is **NOT** required **UNLESS** otherwise specified in **bold** below.

NOTE: The joint specific exam testing list below is intended to be thorough but cannot possibly be all inclusive. Advanced imaging is indicated for any orthopedic exam test that clearly suggests joint instability

Joint specific advanced imaging is indicated for any positive orthopedic sign listed below:

~~**to approve advanced imaging. A positive sign is weakness or pain. Any test that suggests joint instability requires further imaging (the below list is not all inclusive)**~~

Shoulder (3)~~(3)~~

If MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

- Physical exam demonstrating a positive result for any **ONE** of the following tests:

Suspected Injury	**Test Name**	**Description**
Subscapularis tendon (4)	Bear hug test	Patient cannot place hand on opposite shoulder or weakness in resisted internal rotation
	Belly press test (Napolean Test)	Patient unable press palm into belly without compensation from wrist flexion
	Internal rotation lag	Inability to maintain hand in a behind the back position in a full internal rotation position
	Lift-off test	Pain/Inability to lift hand off of lower back
Supraspinatus tendon (5,6)	Drop arm test	Inability to avoid drop of arm when released from shoulder level (90-degree) abduction
	Empty can test (Jobe or supraspinatus test)	Pain/weakness with resistance when in emptying can position (arm 90-degree abducted, thumb down)

Suspected Injury	Test Name	Description
	Full can test	Pain/weakness with resistance when in full can position (arm 90-degree abducted, thumb up)
	Hawkins Test (ONLY for evaluation of suspected rotator cuff tear and NOT for impingement)	Pain with passive internal rotation of shoulder with arm in 90-degree flexion and elbow and hand in below the head position
	Neer Test (ONLY for evaluation of suspected rotator cuff tear and NOT for impingement)	Pain with passive internal rotation of shoulder and full elbow extension, arm is forward flexed to overhead position.
Infraspinatus / Teres Minor / Biceps tendon [7]	External rotation lag sign at 0 and 90 degrees	Patient cannot maintain external rotation position and arm lags into internal rotation
	Hornblower test	Inability to maintain external rotation position (hand towards mouth – horn blower position) against resistance
	Resisted external rotation testing	Pain/weakness during resisted shoulder external rotation
	Biceps Popeye sign (if acute finding and/or for evaluation of surgical correction)	Visible bulge in lower arm (near elbow) resembling the cartoon character Popeye's muscular arms
Labral tear/shoulder instability [8]	Anterior load and shift Test	Shoulder laxity with axial load and anterior shift of the humeral head across a stabilized scapula
	Apprehension Test	Positioning the patient with their arm abducted to 90 degrees and then externally rotating the arm while observing for signs of apprehension or discomfort.
	Clunk test	Clunk/grinding while externally rotating the arm and pushing anteriorly on the humeral head

Suspected Injury	Test Name	Description
	Crank test (Compression-rotation test, Apprehension test, Apley Grind test)	Pain/click with axial compression load on the humerus with internal and external rotation of the arm
	Jerk Test	Click with axial load on the humerus and the arm moved horizontally in 90 degrees abduction and internal rotation
	O'Brien's test	Pain/click with upward force while in position of pronation of the elbow and full shoulder rotation versus no pain/click while in position of supination of the elbow
	Posterior load and shift test	Shoulder laxity with axial load and posterior shift of the humeral head across a stabilized scapula
	Sulcus sign (Multidirectional instability)	Visible depression/groove (sulcus) between the acromion and the humeral head with downward traction on the arm
Rotator Cuff	Weakness	Weakness specifically of the rotator cuff (no particular 1-5 strength exam score required)

- ~~(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)~~

Elbow (9)~~(9)~~

If MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

- Physical exam demonstrating a positive result for any **ONE** of the following tests:

Suspected Injury	Test Name	Description
Biceps tendon (10)	Biceps squeeze test	Lack of forearm supination with squeeze of the biceps muscle

Suspected Injury	Test Name	Description
	Bicipital aponeurosis (BA) flex test	Direct palpation of a defect in the bicipital aponeurosis with arm in flexion
	Hook test	Inability to "hook" the distal biceps tendon with resisted forearm supination
	Passive forearm pronation test (supination-pronation test)	Absence of the normal proximal-to-distal movement of the biceps muscle belly during passive pronation and supination of the forearm
	Reverse Popeye sign (if acute finding OR for possible surgical correction)	Visible bulge in upper arm (near shoulder) resembling the cartoon character Popeye's muscular arms
Elbow joint instability (11)	Milking maneuver	Pain/elbow instability with lateral pull on the thumb (like a cow udder) with the arm in a flexed supinated position
	Posterolateral rotatory drawer test	Laxity with anterior to posterior force to radial and ulna with the forearm in external rotation
	Push-up test	Pain/click while patient pushes up out of a chair from a sitting position
	Tabletop relocation test	Pain/click while pushing up from a tabletop position with elbows pointing laterally
	Valgus stress	Pain/laxity with medially directed (valgus) pressure with upper arm stabilized
	Varus stress	Pain/laxity with laterally directed (varus) pressure with upper arm stabilized

Wrist (12–14)~~(11,12,13,14)~~

If MRI is contraindicated or cannot be performed, or requested as a CT arthrogram

- Physical exam demonstrating a positive result for any **ONE** of the following tests:

Suspected Injury	Test Name	Description
Lunotriquetral (LT) ligament tear	Derby relocation test	Reduced pain with stabilization of LT and moving wrist in dart-throwing motion
	Reagan test (lunotriquetral ballottement test, shuck test)	Pain/click/laxity while stabilizing the triquetrum and applying volar/dorsal force to the lunate.
Triangular Fibrocartilage Complex (TFCC)	Press Test	Pain while pushing up out of a seated position from a chair with armrests with the wrist in extension
	Ulnar fovea sign/test	Pain with deep palpation in the space between ulnar styloid process and flexor carpi ulnaris
	Ulnocarpal stress test (Sharpey's Test)	Pain with axial load on the wrist in maximum ulnar deviation while supinating and pronating wrist
Scaphoid ligament	Scapholunate ballottement test	Pain/click/laxity with volar/dorsal displacement of scaphoid while stabilizing the lunate
	Watson test (scaphoid shift test)	Pain/click with dorsally directed pressure on the scaphoid while wrist moved from ulnar to radial deviation

~~Tendon or Muscle Rupture (14)~~

~~After X-Ray and/ or ultrasound and not listed above~~

~~(i.e.,)~~

Shoulder Dislocations (15–18)~~(15,16,17,18)~~

If MRI is contraindicated or cannot be performed or if , ~~unless r~~requested as CT arthrogram ~~or to evaluate glenoid bone stock or size of Hill-Sachs lesion.~~

- Recurrent shoulder dislocation

- First dislocation with any **ONE** of the situations below that increase the risk of repeated shoulder dislocation:
  - Anterior glenoid bone loss or humeral head bone loss (Hill-Sachs lesion) on prior X-ray
  - Bony Bankart lesion (fracture of the glenoid rim that occurs with a tear in the anterior labrum) on prior X-ray
  - 14 - 40 years old
  - > 40 years old with exam findings concerning for rotator cuff tear (sSuch as weakness on shoulder exam)
  - ~~radiographs~~
  - ~~(i.e.,)~~

~~**NOTE:** 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 to confirm that an "off-track" lesion is not present, as it helps to predict the likelihood of further dislocation and the need for bone augmentation (Latarjet) or additional soft tissue (Remplissage) 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.~~

Suspected Upper Extremity Tendon or Muscle Rupture

If MRI is contraindicated or cannot be performed

High clinical suspicion of a specific tendon rupture with **ALL** of the following:

- After X-ray completed
- Mechanism of injury (sSuch as excess muscle/tendon load, direct blow, high speed impact event) and/or physical findings (sSuch as palpable defect in the triceps, pectoralis tendon rupture on exam) consistent with a possible tendon rupture

Upper Extremity Trauma

Suspected Bone Fracture *(19)*

- Suspected occult scaphoid fracture
  - Snuffbox pain after initial X-ray
- Suspected non scaphoid occult, stress or insufficiency fracture with **ALL** of the following:
  - With a negative initial X-ray
  - X-rays, taken 10-14 days or more after the injury or initial clinical assessment are

negative or indeterminate

- Suspected pathologic fracture on prior X-ray
- Concern for impending fracture on prior X-ray
- Suspected nonunion or delayed union as demonstrated by a lack of bone healing on two or more sets of Xx-rays 4 to 8 months or more apart [20]

~~or Ligament Injury~~ ~~[19]~~

~~**If MRI is contraindicated or cannot be performed;**~~

- ~~Repeat in if negative or non-diagnostic~~
- ~~or CT~~
- ~~Suspected ligamentous/tendon injury with known fractures on x-ray/CT that may require surgery~~

Known Bone Fracture

- Known traumatic fractures on prior imaging with suspected associated ligament or tendon injury

~~Fracture Nonunion~~ ~~[20]~~

~~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.~~

Osteochondral Lesions [21,22] ~~[21,22]~~

Defects, Fractures, Osteochondritis Dissecans

- Clinical suspicion based with completed prior X-ray that is indeterminate or abnormal and any **ONE** of the following:
  - Suspicious mechanism of injury (sSuch as prior twisting type joint injury, repeated joint microtrauma)
  - Suspicious physical findings (sSuch as focal pain, decreased range of motion, or joint clicking/catching).

~~In the setting of joint pain or mechanical symptoms~~

Joint Prosthesis / Replacement [23,24]

- Suspected joint prosthesis loosening, infection, or dysfunction, after initial X-rays

- Suspected metallosis (increased serum levels of metal ions) with painful metal on metal hip replacement [25,26]~~(28)~~ after initial X~~x~~-rays completed and any **ONE** of the following:
  - Significantly elevated Cobalt levels (normal level is less than 1.7 micrograms/liter (ppb)) [27]
  - Significantly elevated Chromium levels (normal level for patients with metallic implants is less than 2.0 micrograms/liter (ppb)) [27]~~(29)~~
  - Indeterminate or abnormal joint aspiration (s~~S~~uch as findings of metallic debris and absence of infection)

Note: Dual-energy CT reduces metal artifact and may be useful in the evaluation of suspected complications after joint replacement

Upper Extremity Vascular Malformation (VM) [28]

If MRI is contraindicated or cannot be performed

- Vascular malformations of the upper extremity with any **ONE** of the following:
  - After initial evaluation with ultrasound and advanced imaging results will change management
  - Indeterminate or abnormal prior ultrasound
  - Preoperative planning
  - Follow up after prior surgical treatment and/or embolization

NOTE: CTA of the upper extremity is also indicated with any of the above conditions

~~**NOTE:** X-ray completed~~

~~**Completed**~~

~~In the setting of~~

~~**e.g., (AVN)**~~

~~Joint Prosthesis/Replacement (25)~~

- ~~Suspected joint prosthesis loosening, infection, or dysfunction, after initial x-rays~~

~~Extremity Mass (26,27)~~

~~Mass or lesion after non-diagnostic x-ray or ultrasound. CT is better than MRI to evaluate mass calcification or bone involvement and may complement or replace MRI~~

- ~~If superficial mass, then ultrasound is the initial study~~

- If deep mass, then x-ray is the initial study
- Inconclusive ultrasound
  - CTA is also approvable

Known Primary Cancer of the Extremity (28,29,30,31)

- Initial 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
- Signs or symptoms or imaging findings suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with radiographs

Loose Bodies or Synovial Chondromatosis (29)(23)

- To evaluate joint pain or mechanical symptoms suspected to be the results of loose bodies and/or chondromatosis (rare, benign condition where multiple cartilaginous nodules form within the synovial lining of a joint) after prior indeterminate or abnormal imaging (X-ray and /or ultrasound)

Osteonecrosis (30)(24)

When MRI is contraindicated or cannot be performed

- To further characterize a prior abnormal X-ray or CT suggesting osteonecrosis
- Symptomatic and high-risk patients (such as glucocorticosteroid use, renal transplant, glycogen storage disease, alcohol abuse, sickle cell anemia) with normal or indeterminate prior X-ray
- Known osteonecrosis (such as avascular necrosis) to evaluate the contralateral joint after initial X-rays are abnormal or indeterminate

Infection / Inflammation

When MRI cannot be performed, or CT is preferred (i.e. tumor matrix), unless follow-up is otherwise specified within the guideline.

- *For initial evaluation of an inconclusive finding on a prior imaging report (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, Joint, or Soft Tissue Abscess *(31)*~~*(32,33)*~~

- Clinical suspicion of infection of the upper extremity with abnormal or indeterminate prior X-ray or ultrasound
- Negative prior X-ray or ultrasound but with a clinical suspicion of advanced infection based on any **ONE** of the following:
  - Signs and symptoms of joint or bone infection such as:
    - Pain and swelling
    - Decreased range of motion
    - Fevers
  - Laboratory findings consistent with possible bone or joint infection such as:
    - Elevated ESR or CRP
    - Elevated white blood cell count
    - Positive joint aspiration
- Upper extremity ulcer (such as diabetic, pressure, ischemic, or traumatic ulcer) with suspected advanced infection with **ALL** of the following [32]:
  - Signs of advanced infection on exam (such as redness, warmth, swelling, exposed bone, bone is encountered when probing the wound, worsening breakdown, worsening smell)
  - No improvement despite prior treatment and bone or deep soft tissue infection is now suspected

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

- ~~of infection include any of the following:~~
- ~~, discharge which may range from white to serosanguineous) that is not improving [33]~~
  - ~~Increased suspicion if size or temperature increases, bone is exposed/positive probe-to-bone test, new areas of breakdown, new smell~~

Inflammatory (Autoimmune) Joint Disease *(33,34)*~~*(34,35)*~~

If MRI is contraindicated or cannot be performed

- For suspected inflammatory joint disease (s~~S~~uch as rheumatoid arthritis, psoriatic arthritis) with any **ONE** of the following:
  - Prior indeterminate or abnormal imaging
  - Prior normal imaging but with lab test results (s~~S~~uch as RF, CRP, ANA, ESR) that

suggest autoimmune disease

- For known inflammatory joint disease (sSuch as rheumatoid arthritis, psoriatic arthritis) with any **ONE** of the following:
  - Recent indeterminate imaging
  - To assess the response to ongoing active medical therapy where prior imaging and/or labs are currently insufficient or have been insufficient in the past
  - To help determine the need to change ongoing active medical therapy based on new/worsening signs or symptoms (such as joint swelling, tenderness, effusion, erythema, warmth, restricted motion, prolonged morning stiffness)

Inflammatory Myopathies (35,36)~~(43)~~

If MRI is contraindicated or cannot be performed

- For suspected inflammatory myopathy (sSuch as polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis) with any **ONE** of the following:
  - Clinical suspicion based on presenting symptoms (ssuch as symmetric extremity weakness)
  - Clinical suspicion based on lab testing (ssuch as muscle enzyme testing)
  - Clinical suspicion based on prior electromyogram (EMG) results
  - For biopsy planning
- For known inflammatory myopathy (sSuch as polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis) with any **ONE** of the following:
  - Prior indeterminate imaging
  - To assess the response to ongoing active medical therapy where prior imaging and/or labs are or have been insufficient
  - To help determine the need to continue or change ongoing active medical therapy where prior imaging and/or labs are or have been insufficient

~~*Evaluation of Known or Suspected Auto-immune Diseases* (34,35)~~

~~**When MRI is contraindicated or cannot be performed**~~

- ~~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): (such as polymyositis, dermatomyositis, immune-mediated necrotizing myopathy, inclusion body myositis)~~
  - ~~For diagnosis~~
  - ~~For biopsy planning~~

~~**e.g. Rheumatoid Arthritis**~~

Known or Suspected Crystalline Arthropathy (37,38) ~~(36)~~

- Use of Dual-energy CT to characterize crystal deposition arthropathy (s~~S~~uch as gout, calcium pyrophosphate deposition (CPPD)) after initial rheumatological work up (s~~S~~uch as serum uric acid, calcium, phosphorus, magnesium levels, joint aspiration) and initial X-rays with any **ONE** of the following:
  - Inconclusive joint aspiration
  - When joint aspiration cannot be performed
  - In the setting of extra-articular crystal deposits (s~~S~~uch as in tendons, joint bursa)

~~disease~~

  - ~~Appropriate ultrasound **AND**~~

Foreign Body (39) ~~(37)~~

- For known or suspected foreign body of the upper extremity with prior imaging that is indeterminate or abnormal

~~Indeterminate x-ray and ultrasound~~

Peripheral Nerve Entrapment (40,41) ~~(38)~~

When MRI is contraindicated or cannot be performed:

- For suspected peripheral nerve entrapment (s~~S~~uch as carpal tunnel) with any **ONE** of the following:
  - Abnormal electromyogram or nerve conduction study

- Abnormal X-ray or ultrasound
- Failed prior 4-week **inactive** conservative treatment including at least two of the following (active treatment with physical therapy is **NOT** required):
  - Activity modification
  - Rest, ice, and/or heat
  - Splinting or orthotics
  - Pharmacotherapy (such as NSAIDs, steroids)
- ~~Clinical suspicion and Medication~~

~~**NOTE**: e.g.,~~

Brachial Plexopathy (42–44)~~(38,39,40)~~

When MRI is contraindicated or cannot be performed

- **Traumatic** Brachial Plexopathy:
  - If mechanism of injury is highly suspicious for brachial plexopathy (s~~S~~uch as birth trauma, mid-clavicular fracture, shoulder dislocation, contact injury to the neck (burner or stinger syndrome) or penetrating injury) (45)~~(41)~~
- **Non-traumatic** Brachial Plexopathy:
  - When Electromyography/Nerve Conduction Velocity (EMG/NCV) studies are suggestive of brachial plexopathy

NOTE: Either Neck MRI, Shoulder MRI or Chest MRI may be appropriate depending on the location of the injury/plexopathy. Only **ONE** of these three studies should be needed to appropriately image the brachial plexus

~~is indicated.~~

Pediatric Specific Indications ~~Pediatrics~~ (Up to Age 18) ~~(41~~42~~)~~

- Osteoid Osteoma - after prior X-ray is indeterminate or abnormal (46)

When MRI is contraindicated or cannot be performed:

- Suspected Chronic Recurrent Multifocal Osteomyelitis after completion of initial X-ray imaging and laboratory evaluation (such as CRP, ESR) (47,48)~~after an x-ray is done~~

Suspected Malignancy

- Suspected malignancy with prior imaging that is abnormal or indeterminate

Known Malignancy (49,50)

Initial Staging

- For initial staging of a primary extremity tumor

Restaging

- Monitoring of a primary extremity tumor on treatment
- End of treatment evaluation of a primary extremity tumor
- Prior to surgery of a primary extremity tumor

Surveillance

- Follow-up of known primary cancer of extremity
  - Every 3-6 months for 2-3 years, then every 6-12 months until 5 years then annually
- Signs or symptoms or imaging findings suspicious for recurrence
- Suspected metastatic disease with signs/symptoms and after initial imaging with X-ray or ultrasound

PRE-~~O~~OPERATIVE OR POSTOPERATIVE ASSESSMENT ~~/PROCEDURAL EVALUATION~~

When not otherwise specified in the guideline

Pre-operative E~~e~~valuation:

- Imaging of the area requested is needed to develop a surgical plan ~~for a planned surgery or procedure~~

Posto-~~O~~perative~~/Procedural~~ Evaluation

- Known or suspected complications
- A clinical reason is provided how imaging may change management

NOTE: This section applies only within the first few months following surgery

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

FURTHER EVALUATION OF INDETERMINATE FINDINGS ~~ON PRIOR IMAGING~~

Unless follow-up is otherwise specified within the guideline

- For initial evaluation of an inconclusive finding on a prior imaging report 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).

CODING AND STANDARDS

Codes~~ing~~

~~*CPT Codes*~~

73200, 73201, 73202, +0722T

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒~~☐~~	Medicare Advantage

BACKGROUND

Conservative Therapy

Conservative therapy should include a multimodality approach consisting of a combination of active and inactive components. Completion of at least one active modality for 4 weeks in the past 6 months is required:

Active Modalities:

- Physical therapy
- Physician-supervised **Home Exercise Program (HEP)**~~**Home Exercise Program (HEP)**~~~~(See Below)~~
- Chiropractic care

Inactive Modalities:

- Medications (e.g., NSAIDs, steroids, analgesics)

- Injections
- Medical Devices (e.g., TENS unit, bracing)

Home Exercise Program (HEP)

The following two elements are required for HEP to meet the criteria ~~guidelines~~ for completion of a trial of active conservative therapy (ACT):

- Information provided on exercise prescription/plan **AND**
- Follow-up with patient regarding completion of HEP over at least a 4-week period OR documented inability to complete HEP due to increased pain with inability to physically perform the prescribed exercises.

NOTE: Patient inconvenience or noncompliance without explanation does not meet the "inability to complete HEP" criterium

~~*Conservative Therapy~~

~~Musculoskeletal therapy 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.~~

- ~~member with information provided (after suitable), or iphysical reason- i.e~~

~~constitute~~

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester)
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds wight limit/dimensions of MRI machine

SUMMARY OF ANALYSIS

EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis [34]

Study Design: This study involved a systematic review and consensus process by an expert group of rheumatologists, radiologists, methodologists, and experienced rheumatology practitioners from 13 countries. They generated 13 key questions on the role of imaging in rheumatoid arthritis (RA) and systematically searched research evidence to develop 10 recommendations

Target Population: Adults (≥ 18 years of age) with a clinical diagnosis of RA

Key Factors:

- Imaging modalities included conventional radiography, ultrasound, MRI, CT, dual-emission x-ray absorptiometry, digital x-ray radiogrammetry, scintigraphy, and positron emission tomography.
- The study identified 6888 references, from which 199 studies were included in the systematic review.
- Recommendations covered the role of imaging in diagnosing RA, detecting inflammation and damage, predicting outcome and response to treatment, monitoring disease activity, progression, and remission.

ACR Appropriateness Criteria Stress (Fatigue-Insufficiency) Fracture Including Sacrum Excluding Other Vertebrae: 2024 Update [19]

Study Design: This study is an update of the American College of Radiology Appropriateness Criteria for stress fractures, including both fatigue and insufficiency types. It involved a systematic analysis of the medical literature from peer-reviewed journals and expert panel reviews

Target Population: Patients with suspected stress fractures, including athletes, older patients, and patients with predisposing conditions

Key Factors:

- Radiography is the imaging modality of choice for baseline diagnosis.
- MRI is preferred for diagnosing radiographically occult stress fractures.
- Nuclear medicine scintigraphy and CT may also be useful diagnostic tools.
- The study emphasizes the importance of prompt therapeutic measures to prevent progression to complete fractures.

Clinical Orthopedic Examination Findings in the Upper Extremity: Correlation with Imaging Studies and Diagnostic Efficacy [13]

Study Design: This study reviewed the diagnostic efficacy of various orthopedic tests for evaluating internal derangements of joints in the upper extremity. It correlated clinical test results with imaging findings, particularly MR imaging.

Target Population: Patients with suspected internal derangements of joints in the upper extremity.

Key Factors: The study presented an algorithmic approach to clinical tests for each joint, starting with general observation and range of motion, followed by specific tests tailored to evaluate individual or grouped anatomic structures. It emphasized the importance of understanding clinical jargon and the proper use of orthopedic tests to aid in the interpretation of radiologic images and enhance communication with orthopedists

ANALYSIS OF EVIDENCE

Shared Findings [13,19,34]**:**

- **Imaging Modalities**: All three studies highlight the importance of various imaging modalities such as MRI, CT, and radiography in diagnosing and managing musculoskeletal conditions. They emphasize the role of imaging in providing detailed insights that complement clinical examinations.
- **Clinical Correlation**: The studies underscore the necessity of correlating imaging findings with clinical assessments to ensure accurate diagnoses and effective treatment plans.
- **Recommendations**: Each study provides specific recommendations or guidelines for the use of imaging in different clinical scenarios, emphasizing evidence-based practices and expert consensus.

Conclusion [13,19,34]**:**

In summary, while all three studies emphasize the critical role of imaging in diagnosing and managing musculoskeletal conditions, they differ in their focus areas, target populations, and specific imaging recommendations. These differences highlight the diverse applications of imaging in various clinical scenarios and the importance of tailored approaches to imaging based on the specific condition being addressed.

POLICY HISTORY

Date	Summary
June 2025	• Guideline number changed from 057-1 to 2062 • Guideline name changed from Upper Extremity CT to Upper Extremity Computed Tomography (CT) ○ Added a subtitle: Arm, Carpal Joint, Hand, Scapula, Shoulder, Upper Extremity, Wrist • Added in general information statement regarding guideline criteria development by reputable sources, standard of care, and best practices • Tables of orthopedic signs added • Metallosis, Inflammatory arthritis, pediatric, metastatic disease

Date	Summary
	indications clarified and updated • Updated Malignancy section • Standardized pre/post-operative language • Edited text for clarity • Adjusted applicable lines of business – Medicare Advantage checked • Background edited • Added a Summary of Evidence and Analysis of Evidence • References updated and expanded
May 2024	• Updated references • Added Contraindications and Preferred Studies section • Updated language on conservative care and home exercise programs
~~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~~

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

REFERENCES

1. Pieters L, Lewis J, Kuppens K, et al. An Update of Systematic Reviews Examining the Effectiveness of Conservative Physical Therapy Interventions for Subacromial Shoulder Pain. *Journal of Orthopaedic & Sports Physical Therapy*. 2020;50(3):131-141. doi:10.2519/jospt.2020.8498
2. Park JY, Park HK, Choi JH, et al. Prospective Evaluation of the Effectiveness of a Home-Based Program of Isometric Strengthening Exercises: 12-Month Follow-up. *Clin Orthop Surg*. 2010;2(3):173. doi:10.4055/cios.2010.2.3.173
3. Varacallo MA, El Bitar Y, Mair SD. Comprehensive Shoulder Evaluation Strategies. *StatPearls*. Published online August 4, 2023. https://www.ncbi.nlm.nih.gov/books/NBK538309/
4. Ghasemi SA, McCahon JAS, Yoo JC, et al. Subscapularis tear classification implications regarding treatment and outcomes: consensus decision-making. *JSES Reviews, Reports, and Techniques*. 2023;3(2):201-208. doi:10.1016/j.xrrt.2022.12.004
5. Katepun S, Boonsun P, Boonsaeng WS, Apivatgaroon A. Reliability of the Single-Arm and Double-Arm Jobe Test for the Diagnosis of Full-Thickness Supraspinatus Tendon Tear. *Orthop J Sports Med*. 2023;11(8). doi:10.1177/23259671231187631
6. Nicolao FA, Junior JAY, Matsunaga FT, Netto NA, Belloti JC, Tamaoki MJS. Comparing shoulder maneuvers to magnetic resonance imaging and arthroscopic findings in patients with supraspinatus tears. *World J Orthop*. 2022;13(1):102-111. doi:10.5312/wjo.v13.i1.102
7. Diplock B, Hing W, Marks D. The long head of biceps at the shoulder: a scoping review. *BMC Musculoskelet Disord*. 2023;24(1):232. doi:10.1186/s12891-023-06346-5
8. Dean RS, Onsen L, Lima J, Hutchinson MR. Physical Examination Maneuvers for SLAP Lesions: A Systematic Review and Meta-analysis of Individual and Combinations of Maneuvers. *Am J Sports Med*. 2023;51(11):3042-3052. doi:10.1177/03635465221100977
9. Kane SF, Lynch JH, Taylor JC. Evaluation of elbow pain in adults. *Am Fam Physician*. 2014;89(8):649-657.
10. Vishwanathan K, Soni K. Distal biceps rupture: Evaluation and management. *J Clin Orthop Trauma*. 2021;19:132-138. doi:10.1016/j.jcot.2021.05.012
11. Karbach LE, Elfar J. Elbow Instability: Anatomy, Biomechanics, Diagnostic Maneuvers, and Testing. *J Hand Surg Am*. 2017;42(2):118-126. doi:10.1016/j.jhsa.2016.11.025
12. Margulies IG, Xu H, Gopman JM, et al. Narrative Review of Ligamentous Wrist Injuries. *J Hand Microsurg*. 2021;13(2):55-64. doi:10.1055/s-0041-1724224
13. Pandey T, Slaughter AJ, Reynolds KA, Jambhekar K, David RM, Hasan SA. Clinical Orthopedic Examination Findings in the Upper Extremity: Correlation with Imaging Studies and Diagnostic Efficacy. *RadioGraphics*. 2014;34(2):e24-e40. doi:10.1148/rg.342125061

14. Ruston J, Konan S, Rubinraut E, Sorene E. Diagnostic accuracy of clinical examination and magnetic resonance imaging for common articular wrist pathology. *Acta Orthop Belg*. 2013;79(4):375-380.

15. Doehrmann R, Frush TJ. Posterior Shoulder Instability. *StatPearls*. Published online July 10, 2023. https://www.ncbi.nlm.nih.gov/books/NBK557648/

16. Nunna B, Parihar P, Wanjari M, Shetty N, Bora N. High-Resolution Imaging Insights into Shoulder Joint Pain: A Comprehensive Review of Ultrasound and Magnetic Resonance Imaging (MRI). *Cureus*. 2023;15(11):e48974. doi:10.7759/cureus.48974

17. Tupe RN, Tiwari V. Anteroinferior Glenoid Labrum Lesion (Bankart Lesion). *StatPearls*. Published online August 3, 2023. https://www.ncbi.nlm.nih.gov/books/NBK587359/

18. White AE, Patel NK, Hadley CJ, Dodson CC. An Algorithmic Approach to the Management of Shoulder Instability. *JAAOS: Global Research and Reviews*. 2019;3(12):e19.00168. doi:10.5435/JAAOSGlobal-D-19-00168

19. Morrison WB, Deely D, Fox MG, et al. ACR Appropriateness Criteria® Stress (Fatigue-Insufficiency) Fracture Including Sacrum Excluding Other Vertebrae: 2024 Update. *Journal of the American College of Radiology*. 2024;21(11):S490-S503. doi:10.1016/j.jacr.2024.08.019

20. Thomas JD, Kehoe JL. Bone Nonunion. *StatPearls*. Published online March 6, 2023. https://www.ncbi.nlm.nih.gov/books/NBK554385/

21. Konarski W, Poboży T, Konarska K, Derczyński M, Kotela I. Understanding Osteochondritis Dissecans: A Narrative Review of the Disease Commonly Affecting Children and Adolescents. *Children*. 2024;11(4). doi:10.3390/children11040498

22. Anderson MW, Chung CB. Elbow Imaging with an Emphasis on MRI. In: Musculoskeletal Diseases 2021-2024: Diagnostic Imaging; 2021.

23. Ong N, Zailan I, Tandon A. Imaging update in arthroplasty. *J Clin Orthop Trauma*. 2021;23:101649. doi:10.1016/j.jcot.2021.101649

24. Roberts CC, Metter DF, Fox MG, et al. ACR Appropriateness Criteria® Imaging After Shoulder Arthroplasty: 2021 Update. *Journal of the American College of Radiology*. 2022;19(5):S53-S66. doi:10.1016/j.jacr.2022.02.019

25. Lee A, Paiement GD, Penenberg BL, Rajaee SS. Metallosis in Total Hip Arthroplasty. *JBJS Rev*. 2023;11(10). doi:10.2106/JBJS.RVW.23.00105

26. Ji JH, Park SE, Parikh D, et al. Metallosis-Induced Conversion Shoulder Arthroplasty: A Unique Experience and Literature Review. *Orthop Surg*. 2023;15(10):2736-2740. doi:10.1111/os.13832

27. Hart AJ, Sabah SA, Bandi AS, et al. Sensitivity and specificity of blood cobalt and chromium metal ions for predicting failure of metal-on-metal hip replacement. *The Journal of Bone and Joint Surgery-British Volume*. 2011;93-B(10):1308-1313. doi:10.1302/0301-620X.93B10.26249

28. Obara P, McCool J, Kalva SP, et al. ACR Appropriateness Criteria® Clinically Suspected Vascular Malformation of the Extremities. *Journal of the American College of Radiology*. 2019;16(11):S340-S347. doi:10.1016/j.jacr.2019.05.013

29. Habusta SF, Mabrouk A, Tuck JA. Synovial Chondromatosis. *StatPearls*. Published online April 22, 2023. https://www.ncbi.nlm.nih.gov/books/NBK470463/

30. Ha AS, Chang EY, Bartolotta RJ, et al. ACR Appropriateness Criteria® Osteonecrosis: 2022 Update. *Journal of the American College of Radiology*. 2022;19(11):S409-S416. doi:10.1016/j.jacr.2022.09.009

31. Pierce JL, Perry MT, Wessell DE, et al. ACR Appropriateness Criteria® Suspected Osteomyelitis, Septic Arthritis, or Soft Tissue Infection (Excluding Spine and Diabetic Foot): 2022 Update. *Journal of the American College of Radiology*. 2022;19(11):S473-S487. doi:10.1016/j.jacr.2022.09.013

32. Wu YW, Wang CY, Cheng NC, et al. 2024 TSOC/TSPS Joint Consensus: Strategies for Advanced Vascular Wound Management in Arterial and Venous Diseases. *Acta Cardiol Sin*. 2024;40(1):1-44. doi:10.6515/ACS.202401_40(1).20231220A

33. Subhas N, Wu F, Fox MG, et al. ACR Appropriateness Criteria® Chronic Extremity Joint Pain-Suspected Inflammatory Arthritis, Crystalline Arthritis, or Erosive Osteoarthritis: 2022 Update. *Journal of the American College of Radiology*. 2023;20(5):S20-S32. doi:10.1016/j.jacr.2023.02.020

34. Colebatch AN, Edwards CJ, Østergaard M, et al. EULAR recommendations for the use of imaging of the joints in the clinical management of rheumatoid arthritis. *Ann Rheum Dis*. 2013;72(6):804-814. doi:10.1136/annrheumdis-2012-203158

35. Malartre S, Bachasson D, Mercy G, et al. MRI and muscle imaging for idiopathic inflammatory myopathies. *Brain Pathology*. 2021;31(3):e12954. doi:10.1111/bpa.12954

36. Nagy H, Veerapaneni KD. Myopathy. *StatPearls*. Published online August 14, 2023. https://www.ncbi.nlm.nih.gov/books/NBK562290/

37. Carotti M, Salaffi F, Filippucci E, et al. Clinical utility of Dual Energy Computed Tomography in gout: current concepts and applications. *Acta Biomedica*. 2020;91(8-S):116-124. doi:10.23750/abm.v91i8-S.9942

38. Shang J, Zhou LP, Wang H, Liu B. Diagnostic Performance of Dual-energy CT Versus Ultrasonography in Gout: A Meta-analysis. *Acad Radiol*. 2022;29(1):56-68. doi:10.1016/j.acra.2020.08.030

39. Campbell EA, Wilbert CD. Foreign Body Imaging. *StatPearls*. Published online July 30, 2023. https://pubmed.ncbi.nlm.nih.gov/29262105/

40. Fortier LM, Markel M, Thomas BG, Sherman WF, Thomas BH, Kaye AD. An Update on Peroneal Nerve Entrapment and Neuropathy. *Orthop Rev (Pavia)*. 2021;13(2):24937. doi:10.52965/001c.24937

41. Griffith JF, Guggenberger R. Peripheral Nerve Imaging. In: *Musculoskeletal Diseases 2021-2024: Diagnostic Imaging [Internet]*. Springer; 2021:259-268. doi:10.1007/978-3-030-71281-5_18

42. Szaro P, McGrath A, Ciszek B, Geijer M. Magnetic resonance imaging of the brachial plexus. Part 1: Anatomical considerations, magnetic resonance techniques, and non-traumatic lesions. *Eur J Radiol Open*. 2022;9:100392. doi:10.1016/j.ejro.2021.100392

43. Szaro P, Geijer M, Ciszek B, McGrath A. Magnetic resonance imaging of the brachial plexus. Part 2: Traumatic injuries. *Eur J Radiol Open*. 2022;9:100397. doi:10.1016/j.ejro.2022.100397

44. Boulter DJ, Job J, Shah LM, et al. ACR Appropriateness Criteria® Plexopathy: 2021 Update. *Journal of the American College of Radiology*. 2021;18(11):S423-S441. doi:10.1016/j.jacr.2021.08.014

45. Sinn C. Brachial Plexopathy: Differential Diagnosis and Treatment. PM&R Knowledge NOW®. June 8, 2022. https://now.aapmr.org/brachial-plexopathy-differential-diagnosis-and-treatment-2/

46. TEPELENIS K, SKANDALAKIS GP, PAPATHANAKOS G, et al. Osteoid Osteoma: An Updated Review of Epidemiology, Pathogenesis, Clinical Presentation, Radiological Features, and Treatment Option. *In Vivo (Brooklyn)*. 2021;35(4):1929-1938. doi:10.21873/invivo.12459

47. Zhao DY, McCann L, Hahn G, Hedrich CM. Chronic nonbacterial osteomyelitis (CNO) and chronic recurrent multifocal osteomyelitis (CRMO). *J Transl Autoimmun*. 2021;4:100095. doi:10.1016/j.jtauto.2021.100095

48. Roderick MR, Shah R, Rogers V, Finn A, Ramanan A V. Chronic recurrent multifocal osteomyelitis (CRMO) – advancing the diagnosis. *Pediatric Rheumatology*. 2016;14(1):47. doi:10.1186/s12969-016-0109-1

49. Referenced with permission from the National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Soft Tissue Sarcoma Version 4.2024. © National Comprehensive Cancer Network, Inc. 2025. All rights reserved. To view the most recent and complete version of the guideline, go online to NCCN.org.

50. Referenced with permission from the National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Bone Cancer Version 1.2025. © National Comprehensive Cancer Network, Inc. 2025. All rights reserved. To view the most recent and complete version of the guideline, go online to NCCN.org.