AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guidelines **UPPER EXTREMITY MRI** **(Hand, Wrist, Arm, Elbow, Long bone, or Shoulder MRI)**	**Original Date: September 1997**
CPT Codes: 73218, 73219, 73220, 73221, 73222, 73223	**Last Revised Date: May 2020**
Guideline Number: NIA_CG_057-3	**Implementation Date: ~~January 2021~~TBD**

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. All prior relevant imaging results, and the reason that alternative imaging (gold standard, protocol, contrast, etc.) cannot be performed must be included in the documentation submitted.

INDICATIONS FOR UPPER EXTREMITY MRI (HAND, WRIST, ARM, ELBOW or SHOULDER) (Plain radiographs must precede MRI evaluation):

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

If an MR Arthrogram fits approvable criteria below, approve as MRI.

Joint specific provocative Orthopedic examination (see Table 1):~~, after x-ray completed~~
Note: With a positive orthopedic sign, an initial x-ray is always preferred. However, it is not required to approve advanced imaging.

- Shoulder (Bencardino, 2013; Jain, 2017; Loh, 2016, Somerville, 2017)
  - Any positive test listed
    - Rotator cuff weakness (van Kampen, 2014)
    - Neer's Sign
    - Hawkins's sign
    - Jobe's test ~~(empty can)~~

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        - **Dropping Sign** ~~Arm test~~
        - **Full can test**
        - **Hornblower's sign**
        - **Anterior Shoulder Apprehension test (Bankart Lesion)**
        - **Load and Shift test (Bankart Lesion)**
        - O'Brien ~~Sign~~**Test**
- **Elbow (Kane 2014, Karbach 2017)**
    - **Any positive test listed**
        - **Valgus stress**
        - ~~Lateral pivot shift test~~
        - **Posterolateral rotatory drawer test**
- **Wrist (Panday, 2014; Ruston, 2013)**
    - **Any positive test listed**
        - **Watson test (scaphoid shift test)**
        - **Scapholunate ballottement test**
        - **Reagan test (lunotriquetral ballottement test)**

Joint or muscle pain without positive findings on an orthopedic exam as listed above, after x-ray completed (Park, 2010; Pieters, 2020)

- Persistent joint or musculotendonous 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.

Extremity Mass

~~(Mullan, 2011; Zoga, 2017)~~

- ~~Adenopathy with increased risk for malignancy (Dommett, 2013; Gaddey, 2016; Mohseni, 2014)~~
    - ~~Any of these:~~
        - ~~Fixation to adjacent tissues~~
        - ~~Firm consistency~~
        - ~~Size >1.5 cm~~
        - ~~Ulceration of overlying skin~~
        - ~~Two or more regions~~
        - ~~Persistence after 4 weeks~~
- Mass or lesion after non-diagnostic x-ray or ultrasound **(ACR, 2017)**
    - ~~Includes one follow-up if first study indeterminate (Subhawong, 2010)~~
    - **If superficial, then ultrasound is the initial study.**
    - **If deep, then x-ray is the initial study.**
    - ~~o~~
- ~~Mass with increased risk for malignancy including any of the following (Sinha, 2010):~~

- ~~Soft tissue mass >5 cm (golf ball size or larger)~~
- ~~Painful lump not from injury~~
- ~~Lump that is increasing in size~~
- ~~A lump of any size that is deep to the muscle fascia~~
- ~~Recurrence of a lump after previous excision~~

Known Cancer of the Extremity
(Fitzgerald, 2015; Holzapfel, 2015; Kircher, 2012; Morrison, 2013; **NCCN, 2019**)

- Cancer staging
- Cancer Restaging
- Signs or symptoms of recurrence

Infection of Bone or Joint
(Beaman, 2017; Dodwell, 2013**; Glaudemans, 2019)**

- 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 ~~localized findings~~ **swelling**
    - Decrease range of motion
    - Fevers
  - Laboratory findings of infection include:
    - Elevated ESR or CRP
    - Elevated white blood cell count
    - Positive joint aspiration

Osteonecrosis (e.g., Avascular necrosis (AVN~~), Perthes Disease~~))
(Felten, 2019; Murphey, 2014; 2016)

- Abnormal x-ray
- Normal X-rays but symptomatic and high risk **(e.g., glucocorticosteroid use, renal transplant recipient, glycogen storage disease, alcohol abuse (Fukushima, 2010), sickle cell anemia (Wali, 2011))**
  - ~~Glucocorticosteroid use~~
  - ~~Glycogen storage disease~~
  - ~~Renal Transplant recipient~~
  - ~~Alcohol abuse (Fukushima, 2010)~~
  - ~~Sickle Cell Anemia (Wali, 2011)~~

For evaluation of known or suspected autoimmune disease (e.g., rheumatoid arthritis):

- Further evaluation of an abnormality or non-diagnostic findings on prior imaging.
- Imaging of a single joint for diagnosis or response to therapy after plain films and appropriate lab tests (e.g., RF, ANA, CRP, ESR~~) (Colebatch, 2013)~~ **(Colebatch, 2013**; **Narvaez, 2010).**

Bone Fracture or Ligament Injury

- **Suspected stress or insufficiency fracture with a negative initial x-ray (ACR, 2016; Sadineni, 2015**;~~Clinical Concern for Occult or Stress Fracture based on all the following (Kijowski, 2012; Sadineni, 2015;Patel, 2011,~~ Yin, 2010)
    - ~~X-rays initially and at ≥ 2 weeks~~**Repeat x-rays in 10-14 days** ~~are~~ **if** negative or non-diagnostic
    - ~~Persistent focal pain and tenderness despite treatment for this time interval: Medications (analgesics and/or anti-inflammatory)~~ ~~**AND**~~ ~~Activity modification with bracing where appropriate~~
    - ~~Fracture on X-ray with documentation of how imaging will affect treatment (Scalcione, 2014)~~
- **Pathologic fracture on x-ray (Fayad, 2005)**
- **Intra articular fractures that may require surgery**
- **Suspected scaphoid fracture with negative x-rays**
- **~~(~~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 (~~-~~Morshed, 2014).**
- ~~~~
- Clinical suspicion based on mechanism of injury and physical findings and x-ray completed
    - TFCC (triangular fibrocartilage complex) injury (Barlow, 2016; Ng, 2017)
    - SLAP (superior labral anterior to posterior complex) lesions (Somerville, 2017)

~~Joint or Muscle Pain, X-ray Completed (Katz, 2013; Mordecai, 2014)~~

- ~~Chronic (lasting 3 months or greater) pain and/or persistent tendonitis 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.~~

Occult wrist ganglion, after indeterminate ultrasound (Meena, 2014)

- Clinical suspicion and failed 4 weeks conservative treatment including all of the below:
    - Activity modification
    - Rest, ice, or heat
    - Splinting or orthotics
    - Medication

~~If MRI is ordered as MR Arthrogram (Magee, 2016; Rhee, 2012) then approve.~~

Osteochondral Lesions (defects, fractures, osteochondritis dissecans) and x-ray done (Smith, 2012; Tuite, 2014; Van Dijk, 2010; Van Bergen, 2016)

- 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 (Rajani, 2016)

Foreign Body
(Laya, 2017)
- Indeterminate x-ray and ultrasound

Tendon or Muscle Rupture after x-ray (Garras, 2012; Peck, 2017; Wilkins, 2012)
- Clinical suspicion based on mechanism of injury and physical findings

Peripheral Nerve Entrapment
(Domkundwar, 2017; Dong, 2012, Donovan, 2010; Meyer, 2018; Tos, 2015)
- 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

~~Joint specific provocative Orthopedic examination, after x-ray completed~~
- ~~Shoulder (Bencardino, 2013; Jain, 2017; Loh, 2016 (Bankart Lesion), Somerville, 2017)~~
  - ~~Any positive test listed~~
    - ~~Neer's Sign~~
    - ~~Hawkins's sign~~
    - ~~Jobe's test (empty can)~~
    - ~~Drop Arm test~~
    - ~~Full can test~~
    - ~~Hornblower's sign~~
    - ~~Anterior Shoulder Apprehension test (Bankart Lesion)~~
    - ~~Load and Shift test (Bankart Lesion)~~
- ~~Elbow (Kane 2014, Karbach 2017)~~
  - ~~Any positive test listed~~
    - ~~Valgus stress~~
    - ~~Lateral pivot-shift test~~
    - ~~Posterolateral rotatory drawer test~~
- ~~Wrist (Panday, 2014; Ruston, 2013)~~
  - ~~Any positive test listed~~
    - ~~Watson test (scaphoid shift test)~~
    - ~~Scapholunate ballottement test~~
    - ~~Reagan test (lunotriquetral ballottement test)~~

~~**Hemarthosis** on arthrocentesis or x-ray, any joint (Bencardino, 2013; Turan, 2015)~~

Brachial Plexopathy (Vijayasarathi, 2016)

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 (Fritz, 2014; 2015)

Table 1: Positive Orthopedic Joint Tests, Upper Extremity

ELBOW
- Moving valgus stress test
- Hook test
- Passive forearm pronation
- Biceps squeeze test
- Biceps Aponeurosis (BA) flex test
- Table top relocation test

SHOULDER
- Anterior draw/anterior load and shift
- Apprehension test
- Drop Arm Test
- Dropping sign
- External rotation lag sign 0 and 90 degrees
- Full can test
- Grind test
- Hawkins or Neer impingement
- Hook test
- Hornsblower test
- HERI (hyper extension-internal rotation)
- Internal rotation lag sign
- Jobe (empty can)
- Lift off test
- Popeye sign
- Posterior draw
- Shift and load test
- Sulcus
- Surprise test
- Yocum

WRIST
- Snuff box pain (after initial x-ray)
- Derby relocation test
- Ulnar foveal sign/test
- Press test
- Ulnocarpal stress test (if concern for TFCC tear)

BACKGROUND:
Magnetic resonance imaging shows the soft tissues and bones. With its multiplanar capabilities, high contrast, and high spatial resolution, it is an accurate diagnostic tool for conditions affecting the joint and adjacent structures. MRI has the ability to positively influence clinicians' diagnoses and management plans for patients with conditions such as primary bone cancer, fractures, abnormalities in ligaments/tendons/cartilage, septic arthritis, and infection/inflammation.

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, (such as 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).

Rotator Cuff Tears – 3.0 Tesla MRI has been found valuable for the detection of partial thickness rotator cuff tendon tears and small rotator cuff tendon tears. It is especially useful in detecting the partial tears due to increased spatial resolution. Increased spatial resolution results in precise measurements of rotator cuff tendon tears in all 3 planes and it also reduces acquisition time which reduces motion artifacts. 3.0 Tesla makes it possible to adequately evaluate tendon edges and avoid underestimation of tears. MRI is less invasive than MR arthrography and it is faster and less expensive. MRI may be useful in the selection of patients that may benefit from arthroscopy.

MRI and Occult Fractures – Magnetic resonance imaging 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. MRI 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.

MRI 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. MRI can be used to evaluate the extent of subchondral necrosis and chondral abnormalities. The images may also help detect intraarticular loose bodies.

MRI 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, MRI may improve diagnostic specificity and accuracy. T1-weighted images can delineate morphologic features of the fracture.

MRI and Brachial Plexus - MRI is the only diagnostic tool that accurately provides high resolution imaging of the brachial plexus. The brachial plexus is formed by the cervical ventral rami of the lower cervical and upper thoracic nerves which arise from the cervical spinal cord, exit the bony confines of the cervical spine, and traverse along the soft tissues of the neck, upper chest, and course into the arms.

Adhesive Capsulitis a.k.a. Frozen Shoulder (Ramirez, 2019; Redler, 2019; Small, 2018) - 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.

The 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 orthopaedics, 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 orthopaedic surgeon to make sure the optimal studies are ordered.

POLICY HISTORY:
Review Date: May 2019
Review Summary:

- 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 peripheral lymphadenopathy; and mass with increased risk for malignancy
- Added indications for foreign body and peripheral nerve entrapment
- 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)

Review Date: May 2020
Review Summary:

- 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 MR Arthrogram fits approvable criteria, approve as MRI.
- Revised the information about an evaluation of an extremity mass.

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