# Raising The Bar In Imaging Stewardship: Electronic Determination Of Appropriate Patient And Exam Selection

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## Background

- Effective January 2022, CMS requires providers to consult appropriate use criteria (AUC) delivered by clinical decision support mechanism (CDSM) when ordering advanced imaging.
- Our institution became a CMS-approved Qualified Provider Led Entity (QPLE) in 2019 designated to develop AUCs, which are integrated into the EMR.

## Objectives

- While use of a CDSM obviates prior authorization for Medicare, many commercial payers require traditional prior authorization processes for advanced imaging.
- Accordingly, our AUCs were designed to (1) ensure the most efficacious imaging test for the suspected condition and (2) confirm that a patients' presentation reflects a reasonable likelihood of the pathology.
- Described here is the evidence in literature for MRI orders regarding hip and shoulder pain, focusing on common ambulatory conditions:
  - Shoulder: suspected rotator cuff or SLAP injury
  - Hip: suspected labral tear, femoral acetabular impingement (FAI), and ischiofemoral impingement

## Materials and Methods

- Literature searches from 1990 to present were performed on evaluating the utility of MRI in shoulder or hip pain.
- Results were screened in duplicate by two radiologists, followed by the same process for full text review.
- From each publication, rules about imaging appropriateness and patient selection criteria were extracted into evidence tables, and graded using Oxford Centre for Evidence Based Medicine Levels of Evidence.
- A multispecialty physician team used the evidence to design exam and patient selection criteria.

## Literature Search

- Shoulder pain: 1497 publications identified 53 articles
- Hip Pain: 408 publications identified 15 articles

## Results

- Strong evidence supports MRI for diagnosis of the 4 conditions (Fig 1, 2)

### Figure 1: Literature Search for Hip Pain

Hip Pain and Suspected Labral Tear, FAI or Ischiofemoral Impingement
↓
408 Titles and Abstracts Screened
↓
27 Full-Text Articles Assess for Eligibility
↓
MRI Appropriateness and Medical Necessity Clinical Indicators
15 Studies Included

| Study Type | N | Evidence Level |
|---|---|---|
| Meta-analysis | 1 | 1 |
| Systematic Review | 2 | 2 |
| Cohort Study | 4 | 2 |
| Retrospective Case-Control | 2 | 3 |
| Case Series | 5 | 4 |
| Economic Analysis | 1 | 4 |

### Figure 2: Literature Search for Shoulder Pain

Shoulder Pain and Suspected RCT or SLAP
↓
1497 Titles and Abstracts Screened
↓
100 Full-Text Articles Assess for Eligibility
↓
MRI Appropriateness
30 Studies Included
↓
Medical Necessity & Clinical Indicators
23 Studies Included

| Study Type | N | Evidence Level |
|---|---|---|
| Meta-analysis | 1 | 1 |
| RCT | 1 | 1 |
| Systematic Review | 4 | 1 (1) & 2 (3) |
| Prospective Investigations | 12 | 1 (1) & 2 (11) |
| Retrospective Investigations | 10 | 1 (3) & 2 (7) |
| Case Controls | 2 | 2 & 3 |

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| Case Controls | 2 | 2 & 3 |

## Clinical Implications

- Physicians can demonstrate accountable use of advanced imaging and facilitate prior authorization by integrating evidence-based selection requirements into CDSMs and documenting medical necessity.
- Collaboration between radiologists and non-radiology specialists is necessary for the design of patient selection rules.
- Clinical decision support tools can guide best practice with respect to advanced imaging. Next steps include analysis of MRI diagnostic yield to validate selection criteria, as well as a comparison of the CDSM approval determination to current standard of care.

- However, high caliber studies identifying reliable physical exam findings were lacking. Accordingly, available evidence and consensus clinical expertise were synthesized to define patient selection criteria for each condition (Fig 3,4).

### Figure 3: Hip Pain, Selection Criteria

**Diagnostic Test Appropriate Use Rules**
1. Hip radiographs should be undertaken prior to MRI (ideally with modified Dunn)
2. MRI is highly effective for diagnosing ischiofemoral impingement
3. MRA is highly effective for diagnosing labral pathology and cartilage lesion
4. Imaging with a 3T MR is better than 1.5T MR for evaluating labral and chondral pathology
5. Consider diagnostic injection in suspected FAI, especially for low sensitivity, low prevalence situations
6. Diagnostic arthroscopy may still have a role in the absence of MRI diagnosis for hip pathology

**MRI Medical Necessity Rules**
In addition to groin or buttock pain, patients must be <50 years of age and have **2 of the following indicators:**

*Radiographic indicators*
1. absence of joint space narrowing
2. Cam or Pincer
3. crossover sign or ischial spine sign
4. OS acetabulae

*Clinical indicators*
1. pain at the end of hip range of motion
2. reproducible groin pain on hip flexion/adduction/internal rotation
3. "positive" response to intra-articular injection
4. prior hip arthroscopy or open hip procedure

### Figure 4: Shoulder Pain, Selection Criteria

**Diagnostic Test Appropriate Use Rules**
1. Radiographs should be performed as the initial imaging test in shoulder pain, as a range of conditions can be identified and subsequently treated (e.g. calcific tendinosis).
2. For suspected rotator cuff tears, US and MRI are equivalent; while US is less expensive, it is highly operator dependent.
3. MRI is superior for looking at intra-articular pathology, such as labral tears.
4. MRI and MRA are similar in efficacy, but a few studies suggested higher sensitivity and specificity in identifying intra-articular pathology with MRA, such as labral tear.

**MRI Medical Necessity Rules**
In addition to pain, patients must have **2 of the following clinical indicators:**

1. traumatic event by history or overuse syndrome (eg pitcher)
2. history of limited function or described weakness
3. physical exam finding of shoulder tenderness
4. painful or limited motion
5. weakness on muscle testing
6. clicking or popping perceived by patient or on physical exam during rotation or shoulder elevation
7. pain with manual shoulder elevation

### Figure 5: Integration into EMR