INTRODUCTION

The Centers for Medicare and Medicaid Services (CMS) Appropriate Use Criteria (AUC) program takes effect January 2020 and requires ambulatory and emergency medicine providers to consult AUC using a CMS approved clinical decision support mechanism when ordering advanced imaging (CT, MRI or nuclear medicine) in eight priority clinical areas (PCAs). Shoulder pain is included in the PCAs. This evidentiary review identified the high-grade evidence in the literature pertaining to the utility of CT, MRI and nuclear medicine patients with traumatic and nontraumatic shoulder pain.

LITERATURE REVIEW

Shoulder Pain Initial Review
Jan. 14, 2019


PRISMA

- 1,180 references imported for screening as 1,180 studies
  - Zero duplicates removed
- 1,180 studies screened against title and abstract
  - 1,112 studies excluded
- 68 studies assessed for full-text eligibility
  - 6 studies excluded
- 62 studies included
  - 31 studies evaluated imaging for suspected rotator cuff tear

Published December 2019
Publication type

- One meta-analysis
- Four systematic reviews
- One randomized clinical trial
- 12 prospective investigations
- 10 retrospective investigations
- Two case controls

Oxford Grade

- Eight studies Grade 1
- 21 studies Grade 2
- One study Grade 3
- Zero studies Grade 4
- Zero studies Grade 5

Shoulder Pain Traumatic Literature Review
Deficient evidence in the initial review prompted a second review Oct. 9, 2019


Published December 2019
PRISMA

- 478 references imported for screening
  - Zero duplicates removed
- 478 studies screened against title and abstract
  - 448 studies excluded
- 30 studies assessed for full-text eligibility
  - Zero studies excluded
- 27 studies included
  - 13 publications provided information about CT and MRI in the setting of shoulder trauma

Publication type

- One prospective exploratory cohort
- One prospective case control
- One prospective observational cohort
- One prospective comparative
- Two retrospective cohorts
- Four retrospective comparatives
- Three clinical practice guidelines

Oxford Grade

- Zero studies Grade 1
- Two studies Grade 2
- Eight studies Grade 3
- Zero studies Grade 4
- Three studies Grade 5

EVIDENCE TABLES

Evidence tables are found separately on the Johns Hopkins Medicine’s Appropriate Use Criteria website.

Published December 2019
## APPROPRIATE USE CRITERIA

<table>
<thead>
<tr>
<th>Nontraumatic shoulder pain</th>
<th>Clinical scenario 1: Neurogenic shoulder pain</th>
<th>Clinical scenario 2: Acute shoulder pain, initial imaging test</th>
<th>Clinical scenario 3: Acute shoulder pain, no suspicion of rotator cuff tear or labral injury</th>
<th>Clinical scenario 4: Acute shoulder pain and osteoarthritis</th>
<th>Clinical scenario 5: Acute shoulder pain and calcific tendinitis</th>
<th>Clinical scenario 6: Acute shoulder pain and inflammatory arthritis</th>
<th>Clinical scenario 7: Acute shoulder pain and suspicion of rotator cuff tear</th>
<th>Clinical scenario 8: Acute shoulder pain and suspicion of labral tear</th>
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</thead>
</table>
| Title                     | Acute unilateral shoulder pain and one or more of the following:  
  • Severe pain  
  • Pain followed by weakness, limpness or paralysis in muscles of the affected arm or shoulder  
  • Lack of muscle control in the shoulder or arm  
  • Lack of sensation or feeling in the shoulder or arm | Acute shoulder pain with no radiographic imaging performed | Acute unilateral shoulder pain and:  
  • normal radiograph  
  • history and physical exam inconsistent with rotator cuff or labral injury | Acute shoulder pain and osteoarthritis on radiograph | Acute shoulder pain and calcific tendinitis on radiograph | Acute shoulder pain and history, physical and radiograph support inflammatory etiology | Acute shoulder pain and each of the following:  
  • Radiograph performed  
  • History and physical consistent with rotator cuff tear | Acute shoulder pain and each of the following:  
  • Radiograph performed  
  • History and physical consistent with labral tear |

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### Johns Hopkins University School of Medicine

**Appropriate Use Criteria**

**Priority Clinical Area: Shoulder Pain**

**Setting: Ambulatory and Emergency Department**

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<table>
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<tr>
<th>AUC Rules</th>
<th>MRI</th>
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<td>Does not meet AUC</td>
<td>CT, CT arthrogram</td>
<td>MRI, CT, CT arthrogram, bone scan</td>
<td>MRI, CT, CT arthrogram</td>
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Appropriate Use Criteria  
Priority Clinical Area: Shoulder Pain  
Setting: Ambulatory and Emergency Department

### Traumatic Shoulder Pain

<table>
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<tr>
<th>Title</th>
<th>Clinical Scenario 1: Initial Exam Following Shoulder Trauma</th>
<th>Clinical Scenario 2: Concern for Radiographically Occult Fracture</th>
<th>Clinical Scenario 3: Radiographically Cleared Shoulder</th>
<th>Clinical Scenario: Shoulder Fracture</th>
</tr>
</thead>
</table>
| **Definition** | Acute Shoulder Trauma and No Imaging | All of the Following:  
• Shoulder Pain Post-Trauma  
• High Suspicion  
• Radiograph Equivocal | All of the Following:  
• Shoulder Pain Post-Trauma  
• Low Suspicion  
• Radiograph Normal | All of the Following:  
• Shoulder Pain Post-Trauma  
• Fracture on Radiograph |

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**MULTIDISCIPLINARY TEAM**

The Johns Hopkins University School of Medicine requires that all practicing physicians participating in the development of AUC disclose any conflicts of interest using the International Committee of Medical Journal Editors (ICJME) form. This information is publically available in a timely fashion upon request, for not less than five years after the most recent published update of the relevant appropriate use criteria. Members of the shoulder pain AUC development team are:

Arjun Chanmugam Emergency Medicine, Johns Hopkins University School of Medicine  
Nadia Eltaki Emergency Medicine, Sibley Memorial Hospital

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Disclosure: AUC developers may receive future royalties from licensure of AUC to CMS approved clinical decision support mechanisms.