

Johns Hopkins University School of Medicine
Appropriate Use Criteria
Priority Clinical Area: Shoulder Pain
Setting: Ambulatory and Emergency Department

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

("shoulder pain"[mh] OR ("shoulder" AND "pain") AND ("diagnostic imaging"[mh] OR "diagnostic imaging" OR "computed tomography"[mh] OR "computed tomography" OR "CT"[tiab] OR "magnetic resonance imaging"[mh] OR "magnetic resonance" OR "MRI" OR "nuclear medicine") AND ("clinical study"[Pt] OR "clinical trial"[Pt] OR "clinical trial protocol"[Pt] OR "comparative study"[Pt] OR "controlled clinical trial"[Pt] OR "evaluation studies"[Pt] OR "meta analysis"[Pt] OR "multicenter study"[Pt] OR "observational study"[Pt] OR "practice guideline"[Pt] OR "randomized controlled trial"[Pt] OR "systematic review"[Pt] OR "validation studies"[Pt] OR "review"[ti] OR "meta-analysis"[ti] OR "randomized"[tiab] OR "randomized"[tiab] OR "clinical study"[ti] OR "clinical trial"[ti] OR "observational study"[ti]) AND 1990:3000[dp] AND eng[la]

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
 - Six studies excluded
- 62 studies included
 - 31 studies evaluated imaging for suspected rotator cuff tear

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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

("shoulder" AND "trauma") AND ("diagnostic imaging"[mh] OR "diagnostic imaging" OR "computed tomography"[mh] OR "computed tomography" OR "CT"[tiab] OR "magnetic resonance imaging"[mh] OR "magnetic resonance" OR "MRI" OR "nuclear medicine") AND ("clinical study"[Pt] OR "clinical trial"[Pt] OR "clinical trial protocol"[Pt] OR "comparative study"[Pt] OR "controlled clinical trial"[Pt] OR "evaluation studies"[Pt] OR "meta analysis"[Pt] OR "multicenter study"[Pt] OR "observational study"[Pt] OR "practice guideline"[Pt] OR "randomized controlled trial"[Pt] OR "systematic review"[Pt] OR "validation studies"[Pt] OR "review"[ti] OR "meta-analysis"[ti] OR "randomized"[tiab] OR "randomized"[tiab] OR "clinical study"[ti] OR "clinical trial"[ti] OR "observational study"[ti]) AND 1990 : 3000[dp] AND eng[la]

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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](#).

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APPROPRIATE USE CRITERIA

Nontraumatic shoulder pain								
Title	Clinical scenario 1: Neurogenic shoulder pain	Clinical scenario 2: Acute shoulder pain, initial imaging test	Clinical scenario 3: Acute shoulder pain, no suspicion of rotator cuff tear or labral injury	Clinical scenario 4: Acute shoulder pain and osteoarthritis	Clinical scenario 5: Acute shoulder pain and calcific tendinitis	Clinical scenario 6: Acute shoulder pain and inflammatory arthritis	Clinical scenario 7: Acute shoulder pain and suspicion of rotator cuff tear	Clinical scenario 8: Acute shoulder pain and suspicion of labral tear
Definition	Acute unilateral shoulder pain and one or more of the following: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Radiograph performed • History and physical consistent with rotator cuff tear 	Acute shoulder pain and each of the following: <ul style="list-style-type: none"> • Radiograph performed • History and physical consistent with labral tear

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AUC Rules								
Consistent with AUC	MRI	No advanced imaging is consistent with AUC	No advanced imaging is consistent with AUC		No advanced imaging is consistent with AUC	No advanced imaging is consistent with AUC	MRI	MRI
Allowable by AUC				CT and MRI pre-arthroplasty			CT arthrogram	CT arthrogram
Does not meet AUC	CT, CT arthrogram	MRI, CT, CT arthrogram, bone scan	MRI, CT, CT arthrogram	CT arthrogram	MRI, CT, CT arthrogram	MRI, CT, CT arthrogram	CT	CT
No AUC available	Bone scan		Bone scan	Bone scan	Bone scan	Bone scan	Bone scan	Bone scan
Evidentiary vs Consensus	Consensus	Consensus	Consensus	Consensus	Consensus	Consensus	Evidentiary	Evidentiary

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Traumatic shoulder pain				
Title	Clinical scenario 1: Initial exam following shoulder trauma	Clinical scenario 2: Concern for radiographically occult fracture	Clinical scenario 3: Radiographically cleared shoulder	Clinical scenario: shoulder fracture
Definition	Acute shoulder trauma and no imaging	All of the following: <ul style="list-style-type: none"> • Shoulder pain post-trauma • High suspicion • Radiograph equivocal 	All of the following: <ul style="list-style-type: none"> • Shoulder pain post-trauma • Low suspicion • Radiograph normal 	All of the following: <ul style="list-style-type: none"> • Shoulder pain post-trauma • Fracture on radiograph
AUC Rules				
Consistent with AUC	No advanced imaging is consistent with AUC	CT	No advanced imaging is consistent with AUC	CT
Allowable by AUC		MRI, Bone scan (if CT can't be performed)		MRI
Does not meet AUC	MRI, CT, CT arthrogram, bone scan		MRI, CT, CT arthrogram, bone scan	Bone scan
No AUC available				
Evidentiary vs Consensus	Consensus	Evidentiary	Consensus	Evidentiary

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:

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