

American College of Radiology ACR Appropriateness Criteria®

Chronic Shoulder Pain

Variant 1: Chronic shoulder pain. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography shoulder	Usually appropriate	Strong	⊕ <0.1 mSv		9	9	0	0	0	0	0	0	0	0	15
		References		Study Quality											
		10 (18599231)		4											
		14 (31201467)		3											
		11 (32298371)		3											
		1 (28537759)		4											
		13 (29504320)		2											
		12 (30423642)		2											
US shoulder	May be appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	5	5	2	1	0	2	9	1	0	0	0
		References		Study Quality											
		10 (18599231)		4											
		14 (31201467)		3											
		11 (32298371)		3											
		1 (28537759)		4											
		13 (29504320)		2											
		12 (30423642)		2											
CT arthrography shoulder	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		1	1	12	1	0	1	1	0	0	0	0

37 (3496760)	3
39 (2740508)	3
28 (32241656)	4
40 (28273425)	3
29 (32195972)	Good
27 (31831029)	Good
41 (32077302)	3

US shoulder	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	0	4	4	7
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References	Study Quality
38 (15069134)	2
45 (19052931)	2
51 (8633460)	4
24 (19457838)	M
46 (32609088)	1
50 (29075914)	3
48 (32117542)	2
47 (32190853)	Good
49 (27755645)	2

MR arthrography shoulder	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	1	0	0	1	4	0	3	1	5
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References	Study Quality
25 (1489363)	3
32 (12147844)	3
33 (10227520)	3
26 (19098184)	3
24 (19457838)	M
30 (31773187)	3
28 (32241656)	4
29 (32195972)	Good
27 (31831029)	Good

		31 (20563802)		3											
CT arthrography shoulder	May be appropriate	Strong	☼☼☼☼ 10-30 mSv		5	5	0	0	1	3	5	5	1	0	0
		References		Study Quality											
		15 (15911667)		3											
		18 (18400443)		4											
		17 (22919041)		2											
		16 (19556150)		2											
Image-guided anesthetic +/- corticosteroid injection shoulder or surrounding structures	May be appropriate	Strong	Varies	Varies	5	5	0	0	1	2	8	2	2	0	0
		References		Study Quality											
		21 (31743987)		1											
		20 (32160504)		1											
		23 (31209618)		3											
		22 (27468666)		4											
MRI shoulder without and with IV contrast	Usually not appropriate	Strong	0 0 mSv	0 0 mSv [ped]	3	3	2	4	5	1	2	0	0	0	1
		References		Study Quality											
		34 (12942203)		4											
		36 (24938663)		2											
		35 (26260536)		2											
CT shoulder with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	12	0	1	1	1	0	0	0	0
CT shoulder without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		1	1	9	4	1	1	0	0	0	0	0
		References		Study Quality											
		19 (29573902)		3											
CT shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	12	0	2	1	0	0	0	0	0

Bone scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	13	1	0	0	1	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	13	1	1	0	0	0	0	0	0
Radiography shoulder additional views	Usually not appropriate	Limited	☼ <0.1 mSv		1	1	8	1	5	1	0	0	0	0	0

References	Study Quality
42 (8865483)	4
43 (15671396)	3
44 (30367278)	3

Variant 3: Chronic shoulder pain. Radiographs demonstrate calcific tendinopathy or calcific bursitis. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Image-guided anesthetic +/- corticosteroid injection shoulder or surrounding structures	Usually appropriate	Strong	Varies	Varies	9	9	0	0	1	0	1	0	2	2	9

References	Study Quality
55 (20414859)	2
59 (19959377)	2
65 (33719606)	2
54 (27554465)	Good
63 (28613120)	1
64 (30975645)	1
58 (30204923)	2
57 (32114063)	1
56 (32451885)	2
60 (31124934)	Good
66 (33040221)	4
67 (27909786)	2

		52 (31650966)		4											
CT shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	12	2	0	0	1	0	0	0	0
MRI shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	10	1	1	1	1	1	0	0	0
Bone scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	13	1	0	1	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	13	1	1	0	0	0	0	0	0
Radiography shoulder additional views	Usually not appropriate	Expert Consensus	☼ <0.1 mSv		1	1	11	0	3	0	1	0	0	0	0

Variant 4: Chronic shoulder pain. Suspect labral pathology or shoulder instability. Initial radiographs normal or inconclusive. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MR arthrography shoulder	Usually appropriate	Strong	0.0 mSv	0.0 mSv [ped]	9	9	0	0	0	0	0	0	0	2	13

References	Study Quality
91 (9275908)	2
92 (8058959)	4
30 (31773187)	3
88 (27826700)	Good
73 (29549380)	3
90 (29582141)	Good
94 (29754193)	3
93 (30476457)	3
89 (28604236)	Good
31 (20563802)	3

		87 (28756510)		1											
		82 (32712787)		2											
MRI shoulder without and with IV contrast	Usually not appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	3	3	4	2	4	4	1	0	0	0	0
		References		Study Quality											
		89 (28604236)		Good											
		34 (12942203)		4											
US shoulder	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	7	2	3	0	2	1	0	0	0
		References		Study Quality											
		101 (31912757)		3											
CT shoulder with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	13	0	1	1	0	0	0	0	0
CT shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	13	0	1	1	0	0	0	0	0
Bone scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	14	1	0	0	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	14	0	1	0	0	0	0	0	0
Radiography shoulder additional views	Usually not appropriate	Limited	☼ <0.1 mSv		1	1	9	3	3	0	0	0	0	0	0
		References		Study Quality											
		1 (28537759)		4											
Image-guided anesthetic +/- corticosteroid injection shoulder or surrounding structures	Usually not appropriate	Limited	Varies	Varies	1	1	12	0	2	0	0	0	1	0	0
		References		Study Quality											
		23 (31209618)		3											

Variant 5: Chronic shoulder pain. Suspect adhesive capsulitis. Initial radiographs normal or inconclusive. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI shoulder without IV contrast	Usually appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	8	8	1	0	0	0	1	2	1	4	6
		References		Study Quality											
		113 (23082152)		4											
		114 (28410478)		2											
Image-guided anesthetic +/- corticosteroid injection shoulder or surrounding structures	Usually appropriate	Strong	Varies	Varies	8	8	0	0	1	0	2	0	2	4	6
		References		Study Quality											
		106 (33517741)		1											
		107 (27566475)		1											
		105 (28619380)		2											
		108 (28687319)		3											
		23 (31209618)		3											
MR arthrography shoulder	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	1	0	0	3	7	2	2	0	0
		References		Study Quality											
		109 (15358849)		3											
US shoulder	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	1	2	1	3	4	1	1	0	2
		References		Study Quality											
		116 (29770850)		3											
		117 (31782541)		3											
		108 (28687319)		3											
		115 (28900523)		1											
MRI shoulder without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	4	5	5	0	1	0	0	0	0
		References		Study Quality											

FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 3-10 mSv [ped]	1	1	13	0	2	0	0	0	0	0	0	0	0
US shoulder	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	1	1	10	1	3	0	1	0	0	0	0	0	0
		References		Study Quality													
		142 (32241666)		4													
Radiography shoulder additional views	Usually not appropriate	Strong	☢ <0.1 mSv		1	1	13	0	1	0	1	0	0	0	0	0	0
		References		Study Quality													
		145 (28395944)		2													
		148 (28735840)		3													
		146 (28943071)		4													
		147 (30528438)		2													

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MR arthrography shoulder	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	1	0	0	0	1	1	2	2	8
		References		Study Quality											
		151 (14730038)		4											
		150 (32241657)		4											
		152 (31078406)		4											
MRI shoulder without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	4	2	9
		References		Study Quality											
		153 (22469406)		4											
		154 (31563430)		2											

		156 (27914845)		4											
		155 (28214172)		2											
CT arthrography shoulder	Usually appropriate	Limited	⚡⚡⚡⚡ 10-30 mSv		7	7	1	0	0	0	2	5	3	3	1
		References		Study Quality											
		73 (29549380)		3											
US shoulder	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	7	7	0	0	0	0	2	1	5	3	4
		References		Study Quality											
		157 (21719319)		2											
		158 (29398398)		3											
Image-guided anesthetic +/- corticosteroid injection shoulder or surrounding structures	May be appropriate	Limited	Varies	Varies	5	5	0	0	2	2	10	1	0	0	0
		References		Study Quality											
		149 (31084488)		1											
CT shoulder with IV contrast	Usually not appropriate	Expert Consensus	⚡⚡⚡ 1-10 mSv		1	1	13	0	1	1	0	0	0	0	0
CT shoulder without IV contrast	Usually not appropriate	Expert Consensus	⚡⚡⚡ 1-10 mSv		1	1	12	1	2	0	0	0	0	0	0
CT shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	⚡⚡⚡ 1-10 mSv		1	1	13	1	0	1	0	0	0	0	0
MRI shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	13	1	1	0	0	0	0	0	0
Bone scan shoulder	Usually not appropriate	Expert Consensus	⚡⚡⚡ 1-10 mSv		1	1	14	1	0	0	0	0	0	0	0
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	⚡⚡⚡⚡ 10-30 mSv	⚡⚡⚡⚡ 3-10 mSv [ped]	1	1	13	2	0	0	0	0	0	0	0
Radiography shoulder additional views	Usually not appropriate	Expert Consensus	⚡ <0.1 mSv		1	1	13	1	0	0	1	0	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at www.acr.org/ac.