

## American College of Radiology ACR Appropriateness Criteria®

### Imaging After Shoulder Arthroplasty

**Variant 1: Adult. Asymptomatic shoulder prosthesis. Routine surveillance.**

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	Limited	☼ <0.1 mSv		9	9	0	0	0	0	0	0	0	1	9
		References	Study Quality												
		7 (39933540)	4												
		4 (39055392)	4												
		11 (24618199)	4												
		12 (22309766)	4												
		2 (31321452)	4												
		51 (34020004)	0												
		13 (22930212)	3												
		17 (23473606)	2												
		15 (30473242)	4												
CT arthrography shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	7	2	1	0	0	0	0	0	0
CT shoulder with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	8	2	0	0	0	0	0	0	0
		References	Study Quality												
		7 (39933540)	4												
CT shoulder without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	7	3	0	0	0	0	0	0	0

CT shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	8	2	0	0	0	0	0	0	0
MRI shoulder without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	7	3	0	0	0	0	0	0	0
		References		Study Quality											
		7 (39933540)		4											
MRI shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	8	2	0	0	0	0	0	0	0
		References		Study Quality											
		7 (39933540)		4											
Bone scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	8	2	0	0	0	0	0	0	0
3-phase bone scan and WBC scan and sulfur colloid scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	9	1	0	0	0	0	0	0	0
		References		Study Quality											
		18 (26652693)		4											
US shoulder	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	6	1	2	1	0	0	0	0	0
		References		Study Quality											
		7 (39933540)		4											
Fluoride PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	9	1	0	0	0	0	0	0	0
Image-guided aspiration shoulder	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	8	2	0	0	0	0	0	0	0
WBC scan and sulfur colloid scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	9	1	0	0	0	0	0	0	0
3-phase bone scan with SPECT or SPECT/CT shoulder	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	8	2	0	0	0	0	0	0	0

3-phase bone scan and WBC scan and sulfur colloid scan with SPECT or SPECT/CT shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	9	1	0	0	0	0	0	0	0
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**Variant 2: Adult. Symptomatic shoulder prosthesis. 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	Limited	☼ <0.1 mSv		9	9	0	0	0	0	0	0	0	0	10

References	Study Quality
7 (39933540)	4
28 (39618534)	3
11 (24618199)	4
2 (31321452)	4
4 (39055392)	4
51 (34020004)	0
12 (22309766)	4
21 (30241984)	4
14 (28131693)	4
16 (28111179)	3

CT shoulder without IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		2	2	3	5	0	1	0	1	0	0	0
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References	Study Quality
7 (39933540)	4
28 (39618534)	3
2 (31321452)	4
30 (39889755)	4
29 (38857595)	4
4 (39055392)	4
27 (20036583)	4





2 (31321452)	4
4 (39055392)	4
22 (1515896)	4

MRI shoulder without and with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	0	0	1	0	1	4	1	1	2
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References	Study Quality
42 (25264437)	4

3-phase bone scan and WBC scan and sulfur colloid scan with SPECT or SPECT/CT shoulder	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		6	6	0	0	0	0	4	3	2	1	0
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References	Study Quality
25 (19038601)	4
10 (16702459)	4
44 (30193652)	4
47 (32657859)	4
45 (33289359)	2
46 (33361187)	3

CT shoulder with IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv		5	5	0	0	1	1	6	2	0	0	0
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CT shoulder without IV contrast	May be appropriate	Limited	☼☼☼ 1-10 mSv		5	5	0	0	1	4	4	0	0	1	0
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References	Study Quality
7 (39933540)	4
2 (31321452)	4

MRI shoulder without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	0	4	4	2	0	0	0
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References	Study Quality
40 (35730745)	3
2 (31321452)	4
42 (25264437)	4

3-phase bone scan and WBC scan and sulfur colloid scan shoulder	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		5	5	0	0	0	2	4	0	3	1	0
		References	Study Quality												
		25 (19038601)	4												
		10 (16702459)	4												
		44 (30193652)	4												
		47 (32657859)	4												
WBC scan and sulfur colloid scan shoulder	May be appropriate	Limited	☼☼☼☼ 10-30 mSv		5	5	0	0	0	3	3	0	3	1	0
3-phase bone scan with SPECT or SPECT/CT shoulder	May be appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	4	4	0	1	3	3	3	0	0	0	0
		References	Study Quality												
		4 (39055392)	4												
		24 (-3194396)	3												
		44 (30193652)	4												
		47 (32657859)	4												
CT shoulder without and with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		3	3	4	1	0	1	3	1	0	0	0
Bone scan shoulder	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		3	3	2	2	3	1	1	0	1	0	0
		References	Study Quality												
		44 (30193652)	4												
CT arthrography shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	7	0	2	0	0	1	0	0	0
Fluoride PET/CT skull base to mid-thigh	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv		1	1	8	1	0	0	0	0	1	0	0
		References	Study Quality												
		48 (31292698)	2												

**Variant 4: Adult. Symptomatic shoulder prosthesis. Infection excluded or considered unlikely. Suspected loosening. Radiography performed. Next imaging study.**





CT shoulder without and with IV contrast	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv		1	1	7	2	1	0	0	0	0	0	0	
		References		Study Quality												
		54 (16829248)		4												
		62 (23412251)		4												
		60 (20551186)		1												
		63 (26234665)		3												
		61 (28561262)		4												
		56 (29426742)		4												
		59 (28796543)		2												
		58 (27186794)		2												
US shoulder	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	6	3	1	0	0	0	0	0	0	
		References		Study Quality												
		7 (39933540)		4												
Fluoride PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		1	1	9	0	1	0	0	0	0	0	0	
Image-guided aspiration shoulder	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	8	0	0	1	1	0	0	0	0	
WBC scan and sulfur colloid scan shoulder	Usually not appropriate	Expert Consensus	⊕⊕⊕⊕ 10-30 mSv		1	1	7	2	1	0	0	0	0	0	0	

**Variant 5: Adult. Symptomatic shoulder prosthesis. Infection excluded or considered unlikely. Suspected rotator cuff tear or other soft tissue abnormality. Radiography performed. Next imaging study.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US shoulder	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	0	0	0	1	1	3	5
		References		Study Quality											

7 (39933540)	4
23 (34536025)	4
36 (12646465)	4
64 (16979047)	3
2 (31321452)	4
4 (39055392)	4
65 (29396098)	4

MRI shoulder without IV contrast	Usually appropriate	Limited	0 0 mSv	0 0 mSv [ped]	8	8	0	0	0	0	0	0	4	3	3
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References	Study Quality
7 (39933540)	4
4 (39055392)	4
64 (16979047)	3
2 (31321452)	4

CT arthrography shoulder	Usually appropriate	Limited	☢☢☢☢ 10-30 mSv		7	7	0	0	0	1	3	0	4	2	0
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References	Study Quality
66 (3715028)	4
68 (15829828)	3
67 (8020238)	4

CT shoulder without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv		3	3	1	2	4	2	1	0	0	0	0
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References	Study Quality
54 (16829248)	4
69 (30268356)	3

CT shoulder with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv		2	2	5	0	4	0	0	0	1	0	0
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References	Study Quality
7 (39933540)	4
54 (16829248)	4
69 (30268356)	3

MRI shoulder without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	2	2	5	2	2	1	0	0	0	0	0
CT shoulder without and with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv		1	1	7	0	1	1	0	0	1	0	0
		References		Study Quality											
		54 (16829248)		4											
		69 (30268356)		3											
Bone scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	8	1	0	1	0	0	0	0	0
3-phase bone scan and WBC scan and sulfur colloid scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	8	2	0	0	0	0	0	0	0
Fluoride PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	9	1	0	0	0	0	0	0	0
Image-guided aspiration shoulder	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	8	1	1	0	0	0	0	0	0
WBC scan and sulfur colloid scan shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	8	1	1	0	0	0	0	0	0
3-phase bone scan with SPECT or SPECT/CT shoulder	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	8	2	0	0	0	0	0	0	0
		References		Study Quality											
		24 (-3194396)		3											
3-phase bone scan and WBC scan and sulfur colloid scan with SPECT or SPECT/CT shoulder	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv		1	1	8	2	0	0	0	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](http://www.acr.org/ac).