## American College of Radiology ACR Appropriateness Criteria<sup>®</sup>

## **Acute Shoulder Pain**

Variant 1: Adult. Acute shoulder pain. Any etiology. Initial imaging.

	Appropri	ateness	005			DDI					F	'inal '	Fabu	latio	ns		
Procedure	Categ	gory	SOE	Adults RR	L Peds	s RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Radiography shoulder	Usua approp		Strong	<b>≎</b> <0.1 mS	v		9	9	0	0	0	0	0	0	1	1	12
			References			Study	Quality										
			9 (17692769)				3										
			7 (20206348)				4										
			11 (24124199)				3										
			10 (19166638)				3										
			12 (35813132)				2										
CT shoulder without IV contrast	Usually approp		Limited	ଝେ≎େ 1-10 mSv	)		2	2	5	3	2	3	0	1	0	0	0
			References			Study	Quality										
			9 (17692769)				3										
			6 (18029890)				2										
			7 (20206348)				4										
			8 (25231817)				3										
CT arthrography shoulder	Usually approp		Expert Consensus	<del>ଡଡଡଡ</del> 10-3 mSv	30		1	1	12	0	0	1	1	0	0	0	0
CT shoulder with IV contrast	Usuall <u>y</u> approp		Expert Consensus	େଡେଡ 1-10 mSv	)		1	1	11	1	1	0	0	0	1	0	0

CT shoulder without and with IV contrast	Usuall approp		Expert Consensus	ତତତ 1-10 mSv		1	1	11	2	0	0	0	0	1	0	0
MR arthrography shoulder	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	1	0	0	0
MRI shoulder without IV contrast	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	0	1	0	0	1	0
MRI shoulder without and with IV contrast	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	2	0	0	0	1	0	0	0
Bone scan shoulder	Usuall approp		Expert Consensus	ତତତ 1-10 mSv		1	1	13	0	1	0	0	0	0	0	0
FDG-PET/CT skull base to mid- thigh	Usuall approp	•	Expert Consensus	<del>ଡଡଡଡ</del> 10-3 mSv	0	1	1	13	1	0	0	0	0	0	0	0
US shoulder	Usuall approp		te		O 0 mSv [ped]	1	1	9	0	1	0	2	1	1	0	0
			References 13 (20848574)		Study	Quality 2										

Variant 2: Adult. Acute shoulder pain. Suspect occult fracture. Radiographs negative or indeterminate. Next imaging study.

	Appropriateness	COF			<b>D</b> (1				F	inal	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
CT shoulder without IV contrast	Usually appropriate	Strong	ବ୍ୟବ୍ୟ 1-10 mSv		9	9	0	0	0	0	0	1	4	0	9
		References		Study	v Quality										
		16 (17325929)			2										
		15 (26295635)			4										
		14 (32656034)			2				_						
MRI shoulder without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	1	5	3	3

			References		Study	v Quality										
			18 (24560469)			4										
			19 (21940587)			3										
			21 (24172671)			4										
			20 (19305272)			2										
			17 (34033918)			2				1					1	
CT arthrography shoulder	Usually approp		Expert Consensus	<del>ହ</del> େହେହ 10-30 mSv	)	1	1	13	0	0	0	0	0	1	0	0
CT shoulder with IV contrast		appropriateConsensusmSvUsually notExpertImage: Consensus		≎≎≎≎ 1-10 mSv		1	1	11	1	1	0	0	0	1	0	0
CT shoulder without and with IV contrast	Usually approp		Expert Consensus	ତେତେ 1-10 mSv		1	1	11	2	0	0	0	0	1	0	0
MR arthrography shoulder	Usually approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	0	0	1	0	1	0	0	0
MRI shoulder without and with IV contrast	Usually approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	10	2	0	1	0	0	1	0	0
Bone scan shoulder	Usually approp		Expert Consensus	ଝେଝିଝ 1-10 mSv		1	1	12	1	0	0	0	1	0	0	0
FDG-PET/CT skull base to mid- thigh	Usually approp		Expert Consensus	ତତତତ 10-30 mSv	)	1	1	13	0	1	0	0	0	0	0	0
US shoulder	Usually approp		Limited	O 0 mSv	O 0 mSv [ped]	1	1	9	0	2	1	0	1	1	0	0
			References			v Quality										
		17 (34033918)				2										

Variant 3: Adult. Acute shoulder pain. Radiographs positive for proximal humerus, scapular, or clavicle fracture. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations           1         2         3         4         5         6         7         8         9

	Appropri	ateness	~~~							F	'inal '	Tabu	latio	ıs		
Procedure	Categ		SOE	Adults RRI	<b>Peds RRL</b>	Rating	Median	1	2	3	4	5	6	7	8	9
CT shoulder without IV contrast	Usua approp		Strong	ତତତ 1-10 mSv		9	9	0	0	0	0	1	1	3	1	8
			References		Study	/ Quality										
			7 (20206348)			4										
			22 (19836976)			3										
			24 (19724000)			4										
			16 (17325929)			2								7         8           1         3         1           1         3         1           0         0         0           0         0         0           0         0         0           1         0         0           1         0         0           1         0         0           1         0         0		
			25 (16054146)			2										
			12 (35813132)			2								7     8       3     1       3     1       0     0       0     0       0     0       0     0       0     0       0     0       0     0       0     0       0     0		
			23 (17169583)			4					1					
MRI shoulder without IV contrast	May approp		Limited	O 0 mSv	O 0 mSv [ped]	4	4	0	2	4	2	5	0	0	0	0
			References		Study	/ Quality										
			19 (21940587)			3										
			26 (19685061)			4										
			15 (26295635)		1	4			1		1	1		1		
CT arthrography shoulder	Usuall approp		Expert Consensus	ଝଝଝଝ 10-3 mSv	0	1	1	13	0	0	0	1	0	0	0	0
CT shoulder with IV contrast	Usuall approp		Expert Consensus	ଡଡଡ 1-10 mSv		1	1	11	1	1	0	0	1	0	0	0
CT shoulder without and with IV contrast	Usuall approp		Expert Consensus	ତତତ 1-10 mSv		1	1	11	2	0	0	0	1	0	0	0
MR arthrography shoulder	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	0	0	1	0	1	0	0	0
MRI shoulder without and with IV contrast	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	1	0	1	0	0	0
Bone scan shoulder	Usuall approp		Expert Consensus	ତତତ 1-10 mSv		1	1	13	1	0	0	0	0	0	0	0

FDG-PET/CT skull base to mid- thigh	Usually not appropriate	Expert Consensus	ବ୍ୟବ୍ୟ 10-30 mSv	&&& 3- 10 mSv [ped]	1	1	13	0	1	0	0	0	0	0	0
US shoulder	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	1	1	0	0	0	0

Variant 4: Adult. Acute shoulder pain. History or physical examination consistent with dislocation or instability. Radiographs positive, negative, or indeterminate. Next imaging study.

Procedure	Appropri Categ	iateness gory	SOE	Adults RRL	Peds RRL	Rating	Median	1	2			Tabu 5	latio		8	9
MRI shoulder without IV contrast			Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	1	0	0	0	0	2	0	10
			References		Study	/ Quality										
		tegory       SOE       Addits KKL       Feas KKL       Kating       Mediat         sually ropriate       Limited       O 0 mSv       O 0 mSv [ped]       9       9         References       Study Quality       2       31 (24060014)       3       3         31 (24060014)       3       3       3       3         ay be ropriate       Expert Opinion       Image: Study Quality       5       5         References       Study Quality       5       5         References       Study Quality       2       30 (23716283)       3         3 (24318071)       2       3       2       2         28 (24318071)       2       2       2       2														
		References       Study Quality         29 (19556150)       2         31 (24060014)       3         33 (19098184)       3         ay be ropriate preement)       Expert Opinion         References       Study Quality         29 (19556150)       2         31 (24060014)       3         33 (19098184)       3         ay be ropriate preement)       Expert Opinion         References       Study Quality         29 (19556150)       2         30 (23716283)       3         8 (25231817)       3         28 (24318071)       2         27 (29119123)       2         ay be ropriate preement)       Expert Opinion         0 0 mSv       0 0 mSv         10 0 mSv       5														
						3										
CT shoulder without IV contrast	approp	oriate					5	0	4	0	1	4	1	3	0	0
			References		Study	V Quality										
			29 (19556150)			2										
			30 (23716283)			3										
			ry       SOL       Addits KLL       reds KLL       Realing       Methan       1       2       3       4         yate       Limited       O 0 mSv $O_0 mSv$ $g$													
			28 (24318071)			2										
			27 (29119123)			2			_	-						
MR arthrography shoulder	approp	oriate	Expert Opinion	O 0 mSv		5	5	4	2	4	1	0	0	1	1	0
			References		Study	/ Quality										
			31 (24060014)			3										
			32 (16244267)			3										

CT arthrography shoulder	Usually not appropriate	Expert Consensus	ବଟଟତ 10-30 mSv		1	1	7	1	2	2	1	0	0	0	0
CT shoulder with IV contrast	Usually not appropriate	Expert Consensus	ଝଝଝ 1-10 mSv		1	1	10	1	0	0	2	1	0	0	0
CT shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	ଝଝଝ 1-10 mSv		1	1	11	1	1	1	0	0	0	0	0
MRI shoulder without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	0	1	0	1	0	0
Bone scan shoulder	Usually not appropriate	Expert Consensus	ବ୍ୟବହ 1-10 mSv		1	1	13	0	1	0	0	0	0	0	0
FDG-PET/CT skull base to mid- thigh	Usually not appropriate	Expert Consensus	ବ୍ତବ୍ତବ୍ତ 10-30 mSv	≎≎≎≎≎ 3- 10 mSv [ped]	1	1	13	0	1	0	0	0	0	0	0
US shoulder	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	0	1	1	0	0	0

Variant 5: Adult. Acute shoulder pain. Physical examination consistent with labral tear. Radiographs negative or indeterminate. Next imaging study.

	Appropria	teness				D (1				]	Final	Tabı	ılatio	ns		
Procedure	Catego		SOE	Adults RR	L Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MR arthrography shoulder	Usuall appropri		Moderate	O 0 mSv	, O 0 mSv [ped]	9	9	1	0	0	1	1	2	0	2	7
			References		Stuc	y Quality										
			33 (19098184)			3										
			41 (24794570)			3										
			32 (16244267)			3										
			38 (17896393)			4										
			37 (21907516)			2										
			40 (20950767)			3										
			42 (22401678)			3										

			39 (23801390)			3										
			43 (27826700)		(	<u> </u>										
			44 (29582141)			Good										
			45 (35122144)			Good										
MRI shoulder without IV contrast	Usua approp		Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	4	3	7
			References		Study	/ Quality									•	
			31 (24060014)			3										
			33 (19098184)			3										
			44 (29582141)		(	Good										
			46 (28604236)		(	Good										
			47 (26779556)			3				-	-					
CT arthrography shoulder	Usua approp		Strong	ଝଝଝଝ 10-30 mSv		7	7	1	0	0	0	4	1	3	5	0
			References		Study	/ Quality										
			29 (19556150)			2										
			36 (21074344)			2										
			34 (22358006)			2										
			35 (31541346)			2										
CT shoulder with IV contrast	Usually approp	y not riate	Expert Consensus	≎≎≎ 1-10 mSv		1	1	11	1	1	0	0	0	1	0	0
CT shoulder without IV contrast	Usually approp		Expert Consensus	≎≎≎ 1-10 mSv		1	1	11	1	0	0	0	1	1	0	0
CT shoulder without and with IV contrast	Usually approp		Expert Consensus	≎≎≎ 1-10 mSv		1	1	11	1	1	0	0	1	0	0	0
MRI shoulder without and with IV contrast	Usually approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	0	1	0	1	0	0
Bone scan shoulder	Usually approp		Expert Consensus	ଝଝଝ 1-10 mSv		1	1	13	1	0	0	0	0	0	0	0

FDG-PET/CT skull base to mid- thigh	Usually not appropriate	Expert Consensus	ବ୍ରବ୍ୟୁ 10-30 mSv	≎≎≎≎≎ 3- 10 mSv [ped]	1	1	13	0	1	0	0	0	0	0	0
US shoulder	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	1	0	1	0	0	0	0

Variant 6: Adult. Acute shoulder pain. Physical examination consistent with rotator cuff tear. Radiographs negative or indeterminate. Next imaging study.

	Appropriateness Category		SOE	Adults RRL	D 1 DD1	Rating	Median	Final Tabulations									
Procedure					Peds RRL			1	2	3	4	5	6	7	8	9	
MRI shoulder without IV contrast	Usually appropriate		Limited	O 0 mSv	O 0 mSv [ped]	9	9	1	0	0	0	0	0	2	1	10	
			References Study Quality														
			29 (19556150) 31 (24060014)		2 3												
			49 (25677796)		M											<b></b>	
US shoulder	Usua approp		Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	0	0	5	6	3	
		References			Study Quality												
			31 (24060014)		3 M												
			49 (25677796)														
			50 (18591598)			2											
			51 (18160242)		3												
			52 (18449121)			3											
			54 (17149764)			2											
		57 (15674840)           56 (18651142)           53 (19457838)           55 (30744304)			2 2 M												
					4				1	1	1	1	1		1	,	
MR arthrography shoulder	Usually not appropriate		Limited	O 0 mSv	O 0 mSv [ped]	2	2	5	2	2	3	0	0	0	0	1	

		References			Study	Study Quality										
		31 (24060014)			3											
		49 (25677796)			М											
		48 (34939473)			Good			_								
CT arthrography shoulder	Usuall approp		Expert Consensus	ଡଡଡଡ 10-3 mSv	30	1	1	8	2	1	2	0	0	0	0	0
CT shoulder with IV contrast	Usuall approp			ତେତେ 1-10 mSv		1	1	11	1	1	0	0	0	1	0	0
CT shoulder without IV contrast	Usuall approp		Expert Consensus	ଝେଝ 1-10 mSv		1	1	11	1	1	0	1	0	0	0	0
CT shoulder without and with IV contrast	Usuall approp		Expert Consensus	ଝେଝ 1-10 mSv		1	1	11	1	1	0	0	0	1	0	0
MRI shoulder without and with IV contrast	Usuall approp		Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	1	0	1	0	0	0	1	0
Bone scan shoulder	Usuall approp		Expert Consensus	ଝେଝ 1-10 mSv		1	1	13	1	0	0	0	0	0	0	0
FDG-PET/CT skull base to mid- thigh	Usuall approp		Expert Consensus	֎֎֎֎ 10-3 mSv	30	1	1	13	0	1	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.