

Revised December 2020

The Weill Cornell Shoulder Pain Appropriate Use Criteria AUC addresses nineteen clinical conditions common to Shoulder Pain, associated with injuries, acute-chronic inflammation of the shoulder joint, tendons, surrounding ligaments, peri-articular structure, or injury to the rotator cuff and subacromial bursa.

### The AUC makes recommendations to optimize diagnostic effectiveness.

	Common Clinical Conditions – Shoulder Pain
0	Not Shoulder Pain
1	Adhesive Capsulitis Known or Suspected
2	Arthroplasty Loosening Known or Suspected - Status Post
3	Avascular Necrosis Known or Suspected
4	Bicipital Tendon Injury Known or Suspected
5	Brachial Plexopathy Known or Suspected
6	Bursitis Known or Suspected
7	Cancer Known or Suspected
8	Cervical Radiculopathy, No Rotator Cuff Injury
9	Glenoid Labral Tear Known or Suspected
10	Heterotopic Bone Known or Suspected
11	Impingement Known or Suspected
12	Infection Known or Suspected
13	Inflammatory Arthritis Known or Suspected
14	Mass Known or Suspected
15	Osteoarthritis Known or Suspected, No Rotator Cuff Injury
16	Post-Trauma Pain, Fracture Known or Suspected
17	Pre-Operative Planning, Known Fracture
18	Rotator Cuff Injury Known or Suspected
19	Shoulder Pain without Trauma

#### The Shoulder Pain AUC is activated when a user orders one of the following eight Imaging Procedures.

	Imaging Procedures
1	CT Arthrogram Shoulder
2	CT Shoulder with Contrast
3	CT Shoulder without Contrast
4	CT Shoulder with and without Contrast
5	MR Shoulder with Contrast
6	MR Shoulder without Contrast
7	MR Shoulder with and without Contrast
8	MR Arthrogram Shoulder



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The Shoulder Pain AUC recommends from the following fourteen Imaging Procedures based on clinical conditions.

	Recommended Imaging Procedures										
1	XR Shoulder										
2	US Shoulder										
3	CT Arthrogram Shoulder										
3	CT Shoulder with Contrast										
4	CT Shoulder without Contrast										
5	CT Shoulder with and without Contrast										
6	MR Shoulder with Contrast										
7	MR Shoulder with Contrast										
8	MR Shoulder without Contrast										
9	MR Shoulder with and without Contrast										
10	MR Arthrogram Shoulder										
11	MR Cervical Spine without Contrast										
12	CT Cervical Spine without Contrast										
13	NM Bone Scan										
14	MR Brachial Plexus without Contrast										

## **Logic Tables**

The following Clinical Condition Logic Tables provide the Shoulder Pain AUC logic for each clinical condition. The logic includes priors, contraindications, metal reduction and advanced US techniques where applicable.

## Key

Value	Score
Blank	No Score Assigned
0	AUC Not Applicable – Allows User to Proceed with Original Order
1	Inappropriate
2	Contact Radiology
3	Appropriate
4	Appropriate Preferred

### **Advice Text**

The Advice Text provided in each condition is for Ordering Provider information and education purposes.

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### Condition 0 – Not Shoulder Pain AUC Logic Activated, AUC Not Applicable

Condition	XR	NS	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo
Not shoulder pain	0	0	0	0	0	0	0	0	0	0	0	0	0	0

#### **Condition 0 - Advice Text**

Not covered by guidelines.

### Condition 1 - Adhesive Capsulitis Known or Suspected

Condition	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Adhesive Capsulitis		1	1	1	1	1	1	1	4	1	1	1	1	1	1	1-8	а
Adhesive Capsulitis	MR	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1-8	b

#### **Condition 1 - Advice Text**

a	MR without contrast	recommended for eva	luation of a	adhesive caps	ulitis.
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b Please call radiology. Patients with adhesive capsulitis with contraindication to MR should be reviewed by a radiologist.

## Condition 2 - Arthroplasty Loosening Known or Suspected - Status Post

Condition	Priors	Metal Reduction Techniques Available?	XR	NS	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Arthroplasty, Loosening Known or Suspected - S/P	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	9-13	а
Arthroplasty, Loosening Known or Suspected - S/P	XR	Yes	1	1	1	1	4	1	1	4	1	1	1	1	1	1	12-16	b
Arthroplasty, Loosening Known or Suspected - S/P	XR	No	1	1	1	1	4	1	1	1	1	1	1	1	1	1	12-14	С

#### **Condition 2 - Advice Text**

а	X-ray recommended for initial evaluation of suspected loosening of artificial joints or hardware failure.
b	CT without contrast or MR without contrast (if metal-reduction techniques are available) recommended after X-
	rays for follow up evaluation of suspected loosening of artificial joints or hardware failure.
С	CT without contrast recommended after X-rays for follow up evaluation of suspected loosening of artificial joints
	or hardware failure

### Condition 3 – Avascular Necrosis Known or Suspected

Condition	Priors	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Avascular Necrosis Known or Suspected	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	17	а
Avascular Necrosis Known or Suspected	XR		1	1	1	1	1	1	1	4	1	1	1	1	1	1	11, 18, 19	b
Avascular Necrosis Known or Suspected	XR	MR	1	1	1	1	1	1	1	1	1	1	1	1	4	1	18	С

#### **Condition 3 - Advice Text**

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MR without contrast recommended after X-rays for follow up evaluation of suspected avascular necrosis.

Bone scan recommended after X-rays for follow-up evaluation of suspected avascular necrosis in patients with contraindication to MR.

## Condition 4 – Bicipital Tendon Injury Known or Suspected

Condition	US Expertise Available?	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Bicipital Tendon Known or Suspected	Yes		1	4	3	1	1	1	1	4	1	1	1	1	1	1	20-30	a
Bicipital Tendon Known or Suspected	Yes	MR	1	4	3	1	1	1	1	1	1	1	1	1	1	1	21, 22, 24, 26-30	b
Bicipital Tendon Known or Suspected	No		1	1	3	1	1	1	1	4	1	1	1	1	1	1	20-23, 25, 30	С
Bicipital Tendon Known or Suspected	No	MR	1	1	4	1	1	1	1	1	1	1	1	1	1	1	21, 22, 30, 31	d

#### **Condition 4 - Advice Text**

a	MR without contrast or advanced ultrasound techniques are recommended for suspected rotator cuff-
	subacromial bursitis-impingement disorders.
b	Advanced ultrasound techniques are recommended for suspected rotator cuff-subacromial bursitis-impingement
	disorders in patients with contraindication to MR.
С	MR without contrast is recommended for suspected rotator cuff-subacromial bursitis-impingement disorders.
d	CT Arthrogram shoulder recommended for suspected rotator cuff-subacromial bursitis-impingement disorders in
	patients with contraindication to MR.

## Condition 5 – Brachial Plexopathy Known or Suspected

Condition	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Brachial Plexopathy Known or Suspected		1	1	1	1	1	1	1	1	1	1	1	1	1	4	32-41	а
Brachial Plexopathy Known or Suspected	MR	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32-41	b

### **Condition 15 - Advice Text**

b Please call radiology. Patients with suspected brachial plexopathy with contraindication to MR should be reviewed with a radiologist.

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#### Condition 6 – Bursitis Known or Suspected

Condition	US Expertise Available?	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Bursitis Known or Suspected	Yes		1	4	3	1	1	1	1	4	1	1	1	1	1	1	42, 43	a
Bursitis Known or Suspected	Yes	MR	1	4	m	1	1	1	1	1	1	1	1	1	1	1	43	b
Bursitis Known or Suspected	No		1	1	3	1	1	1	1	4	1	1	1	1	1	1	42	С
Bursitis Known or Suspected	No	MR	1	1	4	1	1	1	1	1	1	1	1	1	1	1	42	d

#### **Condition 6 - Advice Text**

а	MR without contrast or advanced ultrasound techniques are recommended for suspected rotator cuff-
	subacromial bursitis-impingement disorders.

b Advanced ultrasound techniques are recommended for suspected rotator cuff-subacromial bursitis-impingement disorders in patients with contraindication to MR.

- c MR without contrast is recommended for suspected rotator cuff-subacromial bursitis-impingement disorders.
- d CT Arthrogram shoulder recommended for suspected rotator cuff-subacromial bursitis-impingement disorders in patients with contraindication to MR.



## Condition 7 - Cancer Known or Suspected

Condition	Priors	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Cancer Known or Suspected	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	44-49	а
Cancer Known or Suspected	XR		1	1	1	1	3	1	1	3	4	1	1	1	1	1	48-54	b
Cancer Known or Suspected	XR	GAD	1	1	1	3	3	1	1	4	1	1	1	1	1	1	48, 49, 52-53	С
Cancer Known or Suspected	XR	MR	1	1	1	3	4	1	1	1	1	1	1	1	1	1	48, 49, 52	d
Cancer Known or Suspected	XR	GAD IOD	1	1	1	1	3	1	1	4	1	1	1	1	1	1	48, 49, 52-53	е
Cancer Known or Suspected	XR	MR IOD	1	1	1	1	3	1	1	1	1	1	1	1	1	1	48, 49, 52	f

### **Condition 7 - Advice Text**

а	Shoulder radiographs preferred for initial exam of suspected infection, cancer, or masses.
b	MR shoulder with and without contrast preferred for suspected infection, cancer, or masses.
С	MR shoulder without contrast preferred for suspected infection, cancer, or masses in patients with
	contraindication to gadolinium.
d	CT shoulder (without contrast OR with contrast) preferred for suspected infection, cancer or masses in patients
	with contraindication to MR.
е	MR shoulder without contrast preferred for suspected infection, cancer or masses in patients with
	contraindication to gadolinium.
f	CT shoulder without contrast preferred for suspected infection, cancer or masses in patients with
	contraindications to MR and iodinated contrast.

## Condition 8 – Cervical Radiculopathy, No Rotator Cuff Injury

Condition	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MRwo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Cervical Radiculopathy No Rotator Cuff Injury		1	1	1	1	1	1	1	1	1	1	4	1	1	1	54	а
Cervical Radiculopathy No Rotator Cuff Injury	MR	1	1	1	1	1	1	1	1	1	1	1	4	1	1	54	b

### **Condition 9 - Advice Text**

а	MR C-spine without contrast recommended for evaluation of cervical radiculopathy.
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CT C-spine without contrast recommended for evaluation of cervical radiculopathy in patients with contraindication to MR.

### Condition 9 – Glenoid Labral Tear Known or Suspected

Condition	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Glenoid Labral Tear		1	1	3	1	1	1	1	4	1	4	1	1	1	1	55-63	а
Glenoid Labral Tear	GAD	1	1	3	1	1	1	1	4	1	1	1	1	1	1	55, 56, 59, 60	b
Glenoid Labral Tear	MR	1	1	4	1	1	1	1	1	1	1	1	1	1	1	55	С

#### **Condition 9 - Advice Text**

b MR shoulder without contrast preferred for suspected glenoid labral tear in patients with contraindication to gadolinium.

c CT Arthrogram shoulder preferred for suspected glenoid labral tear in patients with contraindication to MR.

## Condition 10 – Heterotopic Bone Known or Suspected

Condition	Contraindications	XR	ns	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Heterotopic Bone		1	1	1	1	4	1	1	4	1	1	1	1	1	1	64-66	а
Heterotopic Bone	MR	1	1	1	1	4	1	1	1	1	1	1	1	1	1	99	b

### **Condition 10 - Advice Text**

а	CT without contrast or MR without contrast recommended for the evaluation of heterotopic bone.
b	CT without contrast recommended for the evaluation of heterotopic bone in patients with contraindication to
	MR.

### Condition 11 - Impingement Known or Suspected

Condition	US Expertise Available?	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Impingement Known or Suspected	Yes		1	4	3	1	1	1	1	4	1	1	1	1	1	1	02-29	а
Impingement Known or Suspected	Yes	MR	1	4	3	1	1	1	1	1	1	1	1	1	1	1	68-70	b
Impingement Known or Suspected	No		1	1	3	1	1	1	1	4	1	1	1	1	1	1	67, 70	С
Impingement Known or Suspected	No	MR	1	1	4	1	1	1	1	1	1	1	1	1	1	1	67, 70	d

#### **Condition 11 - Advice Text**

а	MR without contrast or advanced ultrasound techniques are recommended for suspected rotator cuff-
	subacromial bursitis-impingement disorders.
b	Advanced ultrasound techniques are recommended for suspected rotator cuff-subacromial bursitis-impingemen

- disorders in patients with contraindication to MR. MR without contrast is recommended for suspected rotator cuff-subacromial bursitis-impingement disorders. С
- CT Arthrogram shoulder recommended for suspected rotator cuff-subacromial bursitis-impingement disorders in patients with contraindication to MR.

## Condition 12 – Infection Known or Suspected

Condition	Priors	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Infection Known or Suspected	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	71	а
Infection Known or Suspected	XR		1	1	1	1	3	1	1	3	4	1	1	1	1	1	71-75	b
Infection Known or Suspected	XR	GAD	1	1	1	3	3	1	1	4	1	1	1	1	1	1	71, 72, 74	С
Infection Known or Suspected	XR	MR	1	1	1	3	4	1	1	1	1	1	1	1	1	1	71, 76	d
Infection Known or Suspected	XR	GAD IOD	1	1	1	1	3	1	1	4	1	1	1	1	1	1	71, 72, 74	е
Infection Known or Suspected	XR	MR IOD	1	1	1	1	3	1	1	1	1	1	1	1	1	1	71, 76	f

### **Condition 12 - Advice Text**

а	Shoulder radiographs preferred for initial exam of suspected infection, cancer, or masses.
b	MR shoulder with and without contrast preferred for suspected infection, cancer, or masses.
С	MR shoulder without contrast preferred for suspected infection, cancer, or masses in patients with
	contraindication to gadolinium.
d	CT shoulder (without contrast OR with contrast) preferred for suspected infection, cancer or masses in patients
	with contraindication to MR.
е	MR shoulder without contrast preferred for suspected infection, cancer or masses in patients with
	contraindication to gadolinium.
f	CT shoulder without contrast preferred for suspected infection, cancer or masses in patients with
	contraindications to MR and iodinated contrast.

## Condition 13 – Inflammatory Arthritis Known or Suspected

Condition	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Inflammatory Arthritis		1	1	1	1	1	1	1	4	3	1	1	1	1	1	77-81	a
Inflammatory Arthritis	GAD	1	1	1	1	1	1	1	4	1	1	1	1	1	1	77-79, 81	b
Inflammatory Arthritis	MR	2	2	2	2	2	2	2	2	2	2	2	2	2	2	77-81	С

### **Condition 13 - Advice Text**

а	MR without contrast recommended for evaluation of inflammatory arthritis.
b	MR without contrast recommended for evaluation of inflammatory arthritis.
С	Please call radiology. Patients with inflammatory arthritis with contraindication to MR should be reviewed by a
	radiologist.

## Condition 14 - Mass Known or Suspected

Condition	Priors	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Mass Known or Suspected	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	66, 82, 83	а
Mass Known or Suspected	XR		1	1	1	1	3	1	1	3	4	1	1	1	1	1	51-53, 66, 82-91	b
Mass Known or Suspected	XR	GAD	1	1	1	3	3	1	1	4	1	1	1	1	1	1	52, 53, 66, 82, 83, 84, 85, 87-90	С
Mass Known or Suspected	XR	MR	1	1	1	3	4	1	1	1	1	1	1	1	1	1	52, 66, 84, 92, 93	d
Mass Known or Suspected	XR	GAD IOD	1	1	1	1	3	1	1	4	1	1	1	1	1	1	52, 53, 66, 832 83, 84, 85, 87-90	е
Mass Known or Suspected	XR	MR IOD	1	1	1	1	3	1	1	1	1	1	1	1	1	1	52, 66, 83, 92	f

#### **Condition 14 - Advice Text**

а	Shoulder radiographs preferred for initial exam of suspected infection, cancer, or masses.
b	MR shoulder with and without contrast preferred for suspected infection, cancer, or masses.
С	MR shoulder without contrast preferred for suspected infection, cancer, or masses in patients with
	contraindication to gadolinium.
d	CT shoulder (without contrast OR with contrast) preferred for suspected infection, cancer or masses in patients
	with contraindication to MR.
е	MR shoulder without contrast preferred for suspected infection, cancer or masses in patients with
	contraindication to gadolinium.
f	CT shoulder without contrast preferred for suspected infection, cancer or masses in patients with
	contraindications to MR and iodinated contrast.

### Condition 15 - Osteoarthritis Known or Suspected, No Rotator Cuff Injury

Condition	Priors	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Osteoarthritis Known or Suspected No Rotator Cuff Injury	No XR	4	1	1	1	1	1	1	1	1	1	1	1	1	1	LBP	а
Osteoarthritis Known or Suspected No Rotator Cuff Injury	XR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	LBP	b

#### **Condition 15 - Advice Text**

X-ray recommended for initial evaluation of suspected osteoarthritis in absence rotator cuff pathology.

Advanced imaging for evaluation of suspected osteoarthritis in absence of rotator cuff pathology not recommended.

## Condition 16 - Post-Trauma Pain, Fracture Known or Suspected

Condition	Priors	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Post-Trauma Pain Known or Suspected Fracture	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	94-96	а
Post-Trauma Pain Known or Suspected Fracture	XR		1	1	1	1	3	1	1	4	1	1	1	1	1	1	94-96	р
Post-Trauma Pain Known or Suspected Fracture	XR	MR	1	1	1	1	4	1	1	1	1	1	1	1	1	1	94-96	С

### **Condition 16 - Advice Text**

а	X-ray recommended for initial evaluation of shoulder trauma.
b	MR without contrast recommended after X-rays for follow-up evaluation shoulder trauma.
С	CT without contrast recommended after X-rays for follow-up evaluation shoulder trauma in patients with
	contraindication to MR.

## Condition 17 – Pre-Operative Planning, Known Fracture

Condition	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MR w	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Pre-Op Planning Known Fracture		1	1	1	1	4	1	1	4	1	1	1	1	1	1	13, 97-101	a
Pre-Op Planning Known Fracture	MR	1	1	1	1	4	1	1	1	1	1	1	1	1	1	13, 97, 98, 101	b

### **Condition 17 - Advice Text**

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b CT without contrast recommended for pre-operative planning in patients with contraindication to MR.

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### Condition 18 - Rotator Cuff Injury Known or Suspected

Condition	US Expertise Available?	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Rotator Cuff Injury	Yes		1	4	3	1	1	1	1	4	1	1	1	1	1	1	21, 22, 56, 67, 102-109	а
Rotator Cuff Injury	Yes	MR	1	4	З	1	1	1	1	1	1	1	1	1	1	1	21, 22, 56, 102, 103, 105-107, 109	b
Rotator Cuff Injury	No		1	1	3	1	1	1	1	4	1	1	1	1	1	1	21, 22, 56, 67, 102- 106, 108, 109	С
Rotator Cuff Injury	No	MR	1	1	4	1	1	1	1	1	1	1	1	1	1	1	56	d

#### **Condition 18 - Advice Text**

а	MR without contrast or advanced ultrasound techniques are recommended for suspected rotator cuff-
	subacromial bursitis-impingement disorders.

- b Advanced ultrasound techniques are recommended for suspected rotator cuff-subacromial bursitis-impingement disorders in patients with contraindication to MR.
- c MR without contrast is recommended for suspected rotator cuff-subacromial bursitis-impingement disorders.
- d CT Arthrogram shoulder recommended for suspected rotator cuff-subacromial bursitis-impingement disorders in patients with contraindication to MR.

#### Condition 19 - Shoulder Pain without Trauma

Condition	Priors	Contraindications	XR	US	CT Arthrogram	CT w	CT wo	CT wwo	MRw	MR wo	MR wwo	MR Arthrogram	MR C-Spine wo	CT C-Spine wo	NM bone	MR Br Plexus wo	Reference	Advice Text
Shoulder Pain without Trauma	No XR		4	1	1	1	1	1	1	1	1	1	1	1	1	1	110, 111	а
Shoulder Pain without Trauma	XR		1	1	1	1	1	1	1	4	1	1	1	1	1	1	111, 112	b
Shoulder Pain without Trauma	XR	MR	2	2	2	2	2	2	2	2	2	2	2	2	2	2	111-112	С

#### **Condition 19 - Advice Text**

а	X-ray recommended for initial evaluation for shoulder pain without trauma.

b MR without contrast recommended as follow-up of X-rays for shoulder pain without trauma.

Please call radiology. Patients with shoulder pain without trauma with contraindication to MR should be reviewed by a radiologist.



## **Sources**

### The Shoulder Pain AUC has been developed by Weill Cornell Medicine utilizing the following published sources and Local Best Practice LBP.

No.	Source	Score
1	Chi AS, Kim J, Long SS, Morrison WB, Zoga AC. Non-contrast MRI diagnosis of adhesive capsulitis of the shoulder. Clin Imaging. 2017;44:46-50. https://pubmed.ncbi.nlm.nih.gov/28410478/	4
2	Suh CH, Yun SJ, Jin W, Lee SH, Park SY, Park JS, et al. Systematic review and meta- analysis of magnetic resonance imaging features for diagnosis of adhesive capsulitis of the shoulder. Eur Radiol. 2019;292:566-77. <a href="https://pubmed.ncbi.nlm.nih.gov/29978436/">https://pubmed.ncbi.nlm.nih.gov/29978436/</a>	5
3	Manton GL, Schweitzer ME, Weishaupt D, Karasick D. Utility of MR arthrography in the diagnosis of adhesive capsulitis. Skeletal Radiol. 2001;306:326-30. https://pubmed.ncbi.nlm.nih.gov/11465773/	4
4	Park S, Lee DH, Yoon SH, Lee HY, Kwack KS. Evaluation of Adhesive Capsulitis of the Shoulder With Fat-Suppressed T2-Weighted MRI: Association Between Clinical Features and MRI Findings. AJR Am J Roentgenol. 2016;2071:135-41. https://pubmed.ncbi.nlm.nih.gov/27070051/	4
5	Emig EW, Schweitzer ME, Karasick D, Lubowitz J. Adhesive capsulitis of the shoulder: MR diagnosis. AJR Am J Roentgenol. 1995;1646:1457-9. https://pubmed.ncbi.nlm.nih.gov/7754892/	4
6	Mengiardi B, Pfirrmann CW, Gerber C, Hodler J, Zanetti M. Frozen shoulder: MR arthrographic findings. Radiology. 2004;2332:486-92 <a href="https://pubmed.ncbi.nlm.nih.gov/15358849/">https://pubmed.ncbi.nlm.nih.gov/15358849/</a>	4
7	Sofka CM, Ciavarra GA, Hannafin JA, Cordasco FA, Potter HG. Magnetic Resonance Imaging of Adhesive Capsulitis: Correlation with Clinical Staging. HSS J. 42008. p. 164-9 <a href="https://pubmed.ncbi.nlm.nih.gov/18815860/">https://pubmed.ncbi.nlm.nih.gov/18815860/</a>	4
8	Zhao W, Zheng X, Liu Y, Yang W, Amirbekian V, Diaz LE, et al. An MRI study of symptomatic adhesive capsulitis. PLoS One. 2012;710:e47277 <a href="https://pubmed.ncbi.nlm.nih.gov/23082152/">https://pubmed.ncbi.nlm.nih.gov/23082152/</a>	4
9	Ha AS, Petscavage JM, Chew FS. Current concepts of shoulder arthroplasty for radiologists: Part 2Anatomic and reverse total shoulder replacement and nonprosthetic resurfacing. AJR Am J Roentgenol. 2012;1994:768-76 <a href="https://pubmed.ncbi.nlm.nih.gov/22997366/">https://pubmed.ncbi.nlm.nih.gov/22997366/</a>	5

10	Raiss P, Edwards TB, Deutsch A, Shah A, Bruckner T, Loew M, et al. Radiographic changes around humeral components in shoulder arthroplasty. J Bone Joint Surg Am. 2014;967:e54	4
	https://pubmed.ncbi.nlm.nih.gov/24695931/	
11	Lin DJ, Wong TT, Kazam JK. Shoulder Arthroplasty, from Indications to Complications: What the Radiologist Needs to Know. <a href="https://pubmed.ncbi.nlm.nih.gov/26761537/">https://pubmed.ncbi.nlm.nih.gov/26761537/</a>	5
12	Gregory TM, Gregory J, Nicolas E, Pierrart J, Masmejean E. Shoulder Arthroplasty Imaging: What's New. Open Orthop J. 2017;11:1126-32 <a href="https://pubmed.ncbi.nlm.nih.gov/29152007/">https://pubmed.ncbi.nlm.nih.gov/29152007/</a>	5
13	Petscavage-Thomas J. Preoperative planning and postoperative imaging in shoulder arthroplasty. Semin Musculoskelet Radiol. 2014;184:448-62.	5
	https://pubmed.ncbi.nlm.nih.gov/25184399/	
14	Gregory T, Hansen U, Khanna M, Mutchler C, Urien S, Amis AA, et al. A CT scan protocol for the detection of radiographic loosening of the glenoid component after total shoulder arthroplasty. Acta Orthop. 2014;851:91-6	5 Small series
	https://pubmed.ncbi.nlm.nih.gov/24286563/	
15	Hayter CL, Koff MF, Shah P, Koch KM, Miller TT, Potter HG. MRI after arthroplasty: comparison of MAVRIC and conventional fast spin-echo techniques. AJR Am J Roentgenol. 2011;1973:W405-11.	4
	https://pubmed.ncbi.nlm.nih.gov/21862766/	
16	Nwawka OK, Konin GP, Sneag DB, Gulotta LV, Potter HG. Magnetic resonance imaging of shoulder arthroplasty: review article. Hss j. 2014;103:213-24.	5
	https://pubmed.ncbi.nlm.nih.gov/25264437/	
17	Hasan SS, Romeo AA. Nontraumatic osteonecrosis of the humeral head. J Shoulder Elbow Surg. 2002;113:281-98.	5
	https://pubmed.ncbi.nlm.nih.gov/12070505/	
18	Bluemke DA, Zerhouni EA. MRI of avascular necrosis of bone. Top Magn Reson Imaging. 1996;84:231-46.	5
	https://pubmed.ncbi.nlm.nih.gov/8870181/	

19	Michael A Mont MA, Ulrich SD, Seyler TM, Smith JM, Marker DR, McGrath MS, et al. Bone scanning of limited value for diagnosis of symptomatic oligofocal and multifocal osteonecrosis. J Rheumatol. 2008;358:1629-34.	4
	https://pubmed.ncbi.nlm.nih.gov/18528962/	
20	Taylor SA, Newman AM, Nguyen J, Fabricant PD, Baret NJ, Shorey M, et al.  Magnetic Resonance Imaging Currently Fails to Fully Evaluate the Biceps-Labrum  Complex and Bicipital Tunnel. Arthroscopy. 2016;322:238-44.	4
	https://pubmed.ncbi.nlm.nih.gov/26440371/	
21	Charousset C, Bellaiche L, Duranthon LD, Grimberg J. Accuracy of CT arthrography in the assessment of tears of the rotator cuff. J Bone Joint Surg Br. 2005;876:824-8.	4
	https://pubmed.ncbi.nlm.nih.gov/15911667/	
22	Omoumi P, Bafort AC, Dubuc JE, Malghem J, Vande Berg BC, Lecouvet FE. Evaluation of rotator cuff tendon tears: comparison of multidetector CT arthrography and 1.5-T MR arthrography. Radiology. 2012;2643:812-22.	4
	https://pubmed.ncbi.nlm.nih.gov/22919041/	
23	Dubrow SA, Streit JJ, Shishani Y, Robbin MR, Gobezie R. Diagnostic accuracy in detecting tears in the proximal biceps tendon using standard nonenhancing shoulder MRI. Open Access J Sports Med. 2014;5:81-7.	4
	https://pubmed.ncbi.nlm.nih.gov/24891814/	
24	Farin PU. Sonography of the biceps tendon of the shoulder: normal and pathologic findings. J Clin Ultrasound. 1996;246:309-16.	5
	https://pubmed.ncbi.nlm.nih.gov/8792271/	
25	Kim JY, Rhee SM, Rhee YG. Accuracy of MRI in diagnosing intra-articular pathology of the long head of the biceps tendon: results with a large cohort of patients. BMC Musculoskelet Disord. 2019;201:270.	4
	https://pubmed.ncbi.nlm.nih.gov/31153372/	
26	Blasi M, De la Fuente J, Perez-Bellmunt A, Zabalza O, Martinez S, Casasayas O, et al. High-resolution ultrasound in the assessment of the distal biceps brachii tendinous complex. Skeletal Radiol. 2019;483:395-404.	4
	https://pubmed.ncbi.nlm.nih.gov/30187110/	

27	de la Fuente J, Blasi M, Martinez S, Barcelo P, Cachan C, Miguel M, et al. Ultrasound classification of traumatic distal biceps brachii tendon injuries. Skeletal Radiol. 2018;474:519-3 <a href="https://pubmed.ncbi.nlm.nih.gov/29177701/">https://pubmed.ncbi.nlm.nih.gov/29177701/</a>	Pending
28	Konschake M, Stofferin H, Moriggl B. Ultrasound visualization of an underestimated structure: the bicipital aponeurosis. Surg Radiol Anat. 2017;3912:1317-22	5
	https://pubmed.ncbi.nlm.nih.gov/28597034/	_
29	Chen HS, Lin SH, Hsu YH, Chen SC, Kang JH. A comparison of physical examinations with musculoskeletal ultrasound in the diagnosis of biceps long head tendinitis. Ultrasound Med Biol. 2011;379:1392-8. <a href="https://pubmed.ncbi.nlm.nih.gov/21767902/">https://pubmed.ncbi.nlm.nih.gov/21767902/</a>	5 cases not pertinent
30	Beltran LS, Beltran J. Biceps and rotator interval: imaging update. Semin Musculoskelet Radiol. 2014;184:425-35. https://pubmed.ncbi.nlm.nih.gov/25184397/	5
31	Koh KH, Kim SC, Yoo JC. Arthroscopic Evaluation of Subluxation of the Long Head of the Biceps Tendon and Its Relationship with Subscapularis Tears. Clin Orthop Surg. 2017;93:332-9. https://pubmed.ncbi.nlm.nih.gov/28861201/	3
32	Lutz AM, Gold G, Beaulieu C. MR imaging of the brachial plexus. Neuroimaging Clin N Am. 2014;241:91-108. <a href="https://pubmed.ncbi.nlm.nih.gov/24210315/">https://pubmed.ncbi.nlm.nih.gov/24210315/</a>	5
33	Rehman I, Chokshi FH, Khosa F. MR imaging of the brachial plexus. Clin Neuroradiol. 2014;243:207-16. https://pubmed.ncbi.nlm.nih.gov/24573785/	5
34	Tharin BD, Kini JA, York GE, Ritter JL. Brachial plexopathy: a review of traumatic and nontraumatic causes. AJR Am J Roentgenol. 2014;2021:W67-75. https://pubmed.ncbi.nlm.nih.gov/24370167/	5
35	Tagliafico A, Succio G, Serafini G, Martinoli C. Diagnostic accuracy of MRI in adults with suspect brachial plexus lesions: a multicentre retrospective study with surgical findings and clinical follow-up as reference standard. Eur J Radiol. 2012;8110:2666-72. <a href="https://pubmed.ncbi.nlm.nih.gov/22071340/">https://pubmed.ncbi.nlm.nih.gov/22071340/</a>	4
36	Todd M, Shah GV, Mukherji SK. MR imaging of brachial plexus. Top Magn Reson Imaging. 2004;152:113-25. https://pubmed.ncbi.nlm.nih.gov/15269614/	5

37	Posniak HV, Olson MC, Dudiak CM, Wisniewski R, O'Malley C. MR imaging of the brachial plexus. AJR Am J Roentgenol. 1993;1612:373-9. https://pubmed.ncbi.nlm.nih.gov/8392788/	5
38	Reede DL. Magnetic resonance imaging of the brachial plexus. Magn Reson Imaging Clin N Am. 1993;11:185-95. https://pubmed.ncbi.nlm.nih.gov/7584211/	5
39	Bilbey JH, Lamond RG, Mattrey RF. MR imaging of disorders of the brachial plexus.  J Magn Reson Imaging. 1994;41:13-8 <a href="https://pubmed.ncbi.nlm.nih.gov/8148550/">https://pubmed.ncbi.nlm.nih.gov/8148550/</a>	4
40	Sherrier RH, Sostman HD. Magnetic resonance imaging of the brachial plexus. J Thorac Imaging. 1993;81:27-33. https://pubmed.ncbi.nlm.nih.gov/8380299/	5
41	van Es HW. MRI of the brachial plexus. Eur Radiol. 2001;112:325-36 https://pubmed.ncbi.nlm.nih.gov/11218035/	5
42	Meraj S, Bencardino JT, Steinbach L. Imaging of cysts and bursae about the shoulder. Semin Musculoskelet Radiol. 2014;184:436-47. https://pubmed.ncbi.nlm.nih.gov/25184398/	5
43	van Holsbeeck M, Strouse PJ. Sonography of the shoulder: evaluation of the subacromial-subdeltoid bursa. AJR Am J Roentgenol. 1993;1603:561-4. https://pubmed.ncbi.nlm.nih.gov/8430553/	5
44	Costelloe CM, Madewell JE. Radiography in the initial diagnosis of primary bone tumors. AJR Am J Roentgenol. 2013;2001:3-7. https://pubmed.ncbi.nlm.nih.gov/23255735/	5
45	Sundaram M, McLeod RA. MR imaging of tumor and tumorlike lesions of bone and soft tissue. AJR Am J Roentgenol. 1990;1554:817-24 https://pubmed.ncbi.nlm.nih.gov/2119115/	5
46	Costelloe CM, Kumar R, Yasko AW, Murphy WA, Jr., Stafford RJ, Lewis VO, et al. Imaging characteristics of locally recurrent tumors of bone. AJR Am J Roentgenol. 2007;1883:855-63 <a href="https://pubmed.ncbi.nlm.nih.gov/17312079/">https://pubmed.ncbi.nlm.nih.gov/17312079/</a>	Pending
47	Priolo F, Cerase A. The current role of radiography in the assessment of skeletal tumors and tumor-like lesions. Eur J Radiol. 1998;27 Suppl 1:S77-85 <a href="https://pubmed.ncbi.nlm.nih.gov/9652506/">https://pubmed.ncbi.nlm.nih.gov/9652506/</a>	5

48	Bohndorf K, Reiser M, Lochner B, Feaux de Lacroix W, Steinbrich W. Magnetic resonance imaging of primary tumours and tumour-like lesions of bone. Skeletal Radiol. 1986;157:511-7. https://pubmed.ncbi.nlm.nih.gov/3775414/	4
49	Pettersson H, Gillespy T, 3rd, Hamlin DJ, Enneking WF, Springfield DS, Andrew ER, et al. Primary musculoskeletal tumors: examination with MR imaging compared with conventional modalities. Radiology. 1987;1641:237-41 <a href="https://pubmed.ncbi.nlm.nih.gov/3588912/">https://pubmed.ncbi.nlm.nih.gov/3588912/</a>	4
50	Seeger LL, Widoff BE, Bassett LW, Rosen G, Eckardt JJ. Preoperative evaluation of osteosarcoma: value of gadopentetate dimeglumine-enhanced MR imaging. AJR Am J Roentgenol. 1991;1572:347-51 <a href="https://pubmed.ncbi.nlm.nih.gov/1853820/">https://pubmed.ncbi.nlm.nih.gov/1853820/</a>	4
51	Beltran J, Chandnani V, McGhee RA, Jr., Kursunoglu-Brahme S. Gadopentetate dimeglumine-enhanced MR imaging of the musculoskeletal system. AJR Am J Roentgenol. 1991;1563:457-66 <a href="https://pubmed.ncbi.nlm.nih.gov/1899738/">https://pubmed.ncbi.nlm.nih.gov/1899738/</a>	5
52	Panicek DM, Gatsonis C, Rosenthal DI, Seeger LL, Huvos AG, Moore SG, et al. CT and MR imaging in the local staging of primary malignant musculoskeletal neoplasms: Report of the Radiology Diagnostic Oncology Group. Radiology. 1997;2021:237-46 <a href="https://pubmed.ncbi.nlm.nih.gov/8988217/">https://pubmed.ncbi.nlm.nih.gov/8988217/</a>	4
53	Aisen AM, Martel W, Braunstein EM, McMillin KI, Phillips WA, Kling TF. MRI and CT evaluation of primary bone and soft-tissue tumors. AJR Am J Roentgenol. 1986;1464:749-56. <a href="https://pubmed.ncbi.nlm.nih.gov/3485348/">https://pubmed.ncbi.nlm.nih.gov/3485348/</a>	4
54	Brown BM, Schwartz RH, Frank E, Blank NK. Preoperative evaluation of cervical radiculopathy and myelopathy by surface-coil MR imaging. AJR Am J Roentgenol. 1988;1516:1205-12 <a href="https://pubmed.ncbi.nlm.nih.gov/2847516/">https://pubmed.ncbi.nlm.nih.gov/2847516/</a>	4
55	Chandnani VP, Yeager TD, DeBerardino T, Christensen K, Gagliardi JA, Heitz DR, et al. Glenoid labral tears: prospective evaluation with MRI imaging, MR arthrography, and CT arthrography. AJR Am J Roentgenol. 1993;1616:1229-35 <a href="https://pubmed.ncbi.nlm.nih.gov/8249731/">https://pubmed.ncbi.nlm.nih.gov/8249731/</a>	4
56	Oh JH, Kim JY, Choi JA, Kim WS. Effectiveness of multidetector computed tomography arthrography for the diagnosis of shoulder pathology: comparison with magnetic resonance imaging with arthroscopic correlation. J Shoulder Elbow Surg. 2010;191:14-20. <a href="https://pubmed.ncbi.nlm.nih.gov/19556150/">https://pubmed.ncbi.nlm.nih.gov/19556150/</a>	4

57	Magee T. 3-T MRI of the shoulder: is MR arthrography necessary? AJR Am J Roentgenol. 2009;1921:86-92 https://pubmed.ncbi.nlm.nih.gov/19098184/	4
58	Roger B, Skaf A, Hooper AW, Lektrakul N, Yeh L, Resnick D. Imaging findings in the dominant shoulder of throwing athletes: comparison of radiography, arthrography, CT arthrography, and MR arthrography with arthroscopic correlation. AJR Am J Roentgenol. 1999;1725:1371-80 <a href="https://pubmed.ncbi.nlm.nih.gov/10227520/">https://pubmed.ncbi.nlm.nih.gov/10227520/</a>	4
59	Grubin J, Maderazo A, Fitzpatrick D. Imaging Evaluation of Superior Labral Anteroposterior SLAP Tears. Am J Orthop Belle Mead NJ. 2015;4410:476-7 <a href="https://pubmed.ncbi.nlm.nih.gov/26447410/">https://pubmed.ncbi.nlm.nih.gov/26447410/</a>	5
60	Bencardino JT, Garcia AI, Palmer WE. Magnetic resonance imaging of the shoulder: rotator cuff. Top Magn Reson Imaging. 2003;141:51-67 <a href="https://pubmed.ncbi.nlm.nih.gov/12606869/">https://pubmed.ncbi.nlm.nih.gov/12606869/</a>	5
61	Amin MF, Youssef AO. The diagnostic value of magnetic resonance arthrography of the shoulder in detection and grading of SLAP lesions: comparison with arthroscopic findings. Eur J Radiol. 2012;819:2343-7 <a href="https://pubmed.ncbi.nlm.nih.gov/21907516/">https://pubmed.ncbi.nlm.nih.gov/21907516/</a>	4
62	Genovese E, Spano E, Castagna A, Leonardi A, Angeretti MG, Callegari L, et al. MR-arthrography in superior instability of the shoulder: correlation with arthroscopy. Radiol Med. 2013;1186:1022-33. https://pubmed.ncbi.nlm.nih.gov/23801390/	5
63	Iqbal HJ, Rani S, Mahmood A, Brownson P, Aniq H. Diagnostic value of MR arthrogram in SLAP lesions of the shoulder. Surgeon. 2010;86:303-9. <a href="https://pubmed.ncbi.nlm.nih.gov/20950767/">https://pubmed.ncbi.nlm.nih.gov/20950767/</a>	4
64	De Smet AA, Norris MA, Fisher DR. Magnetic resonance imaging of myositis ossificans: analysis of seven cases. Skeletal Radiol. 1992;218:503-7. <a href="https://pubmed.ncbi.nlm.nih.gov/1465642/">https://pubmed.ncbi.nlm.nih.gov/1465642/</a>	5
65	Kransdorf MJ, Meis JM, Jelinek JS. Myositis ossificans: MR appearance with radiologic-pathologic correlation. AJR Am J Roentgenol. 1991;1576:1243-8. <a href="https://pubmed.ncbi.nlm.nih.gov/1950874/">https://pubmed.ncbi.nlm.nih.gov/1950874/</a>	5
66	Harish S, Saifuddin A, Bearcroft PW. Soft-tissue masses in the shoulder girdle: an imaging perspective. Eur Radiol. 2007;173:768-83. <a href="https://pubmed.ncbi.nlm.nih.gov/16642327/">https://pubmed.ncbi.nlm.nih.gov/16642327/</a>	5

67	Iannotti JP, Zlatkin MB, Esterhai JL, Kressel HY, Dalinka MK, Spindler KP. Magnetic resonance imaging of the shoulder. Sensitivity, specificity, and predictive value. J Bone Joint Surg Am. 1991;731:17-29. https://pubmed.ncbi.nlm.nih.gov/1985990/	4
68	Tagg CE, Campbell AS, McNally EG. Shoulder impingement. Semin Musculoskelet Radiol. 2013;171:3-11. https://pubmed.ncbi.nlm.nih.gov/23487328/	5
69	Pesquer L, Borghol S, Meyer P, Ropars M, Dallaudiere B, Abadie P. Multimodality imaging of subacromial impingement syndrome. Skeletal Radiol. 2018;477:923-37. <a href="https://pubmed.ncbi.nlm.nih.gov/29445933/">https://pubmed.ncbi.nlm.nih.gov/29445933/</a>	5
70	Campbell RS, Dunn A. External impingement of the shoulder. Semin Musculoskelet Radiol. 2008;122:107-26 <a href="https://pubmed.ncbi.nlm.nih.gov/18509791/">https://pubmed.ncbi.nlm.nih.gov/18509791/</a>	5
71	Gold RH, Hawkins RA, Katz RD. Bacterial osteomyelitis: findings on plain radiography, CT, MR, and scintigraphy. AJR Am J Roentgenol. 1991;1572:365-70 <a href="https://pubmed.ncbi.nlm.nih.gov/1853823/">https://pubmed.ncbi.nlm.nih.gov/1853823/</a>	5
72	Morrison WB, Schweitzer ME, Bock GW, Mitchell DG, Hume EL, Pathria MN, et al. Diagnosis of osteomyelitis: utility of fat-suppressed contrast-enhanced MR imaging. Radiology. 1993;1891:251-7. <a href="https://pubmed.ncbi.nlm.nih.gov/8204132/">https://pubmed.ncbi.nlm.nih.gov/8204132/</a>	4
73	Karchevsky M, Schweitzer ME, Morrison WB, Parellada JA. MRI findings of septic arthritis and associated osteomyelitis in adults. AJR Am J Roentgenol. 2004;1821:119-22. <a href="https://pubmed.ncbi.nlm.nih.gov/14684523/">https://pubmed.ncbi.nlm.nih.gov/14684523/</a>	4
74	Tang JS, Gold RH, Bassett LW, Seeger LL. Musculoskeletal infection of the extremities: evaluation with MR imaging. Radiology. 1988;1661 Pt 1:205-9 <a href="https://pubmed.ncbi.nlm.nih.gov/3336680/">https://pubmed.ncbi.nlm.nih.gov/3336680/</a>	5 Small series
75	Hopkins KL, Li KC, Bergman G. Gadolinium-DTPA-enhanced magnetic resonance imaging of musculoskeletal infectious processes. Skeletal Radiol. 1995;245:325-30 <a href="https://pubmed.ncbi.nlm.nih.gov/7570151/">https://pubmed.ncbi.nlm.nih.gov/7570151/</a>	4
76	Fayad LM, Carrino JA, Fishman EK. Musculoskeletal infection: role of CT in the emergency department. Radiographics. 2007;276:1723-36 https://pubmed.ncbi.nlm.nih.gov/18025514/	5
77	Lambert RGW, Ostergaard M, Jaremko JL. Magnetic Resonance Imaging in Rheumatology. Magn Reson Imaging Clin N Am. 2018;264:599-613. https://pubmed.ncbi.nlm.nih.gov/30316470/	5

78	Lambert RG, Bakker PA, van der Heijde D, Weber U, Rudwaleit M, Hermann KG, et al. Defining active sacroiliitis on MRI for classification of axial spondyloarthritis: update by the ASAS MRI working group. Ann Rheum Dis. 2016;7511:1958-63 https://pubmed.ncbi.nlm.nih.gov/26768408/	5
79	Burge AJ, Nwawka OK, Berkowitz JL, Potter HG. Imaging of Inflammatory Arthritis in Adults: Status and Perspectives on the Use of Radiographs, Ultrasound, and MRI. Rheum Dis Clin North Am. 2016;424:561-85. https://pubmed.ncbi.nlm.nih.gov/27742015/	5
80	Jevtic V, Watt I, Rozman B, Kos-Golja M, Demsar F, Jarh O. Distinctive radiological features of small hand joints in rheumatoid arthritis and seronegative spondyloarthritis demonstrated by contrast-enhanced Gd-DTPA magnetic resonance imaging. Skeletal Radiol. 1995;245:351-5 <a href="https://pubmed.ncbi.nlm.nih.gov/7570155/">https://pubmed.ncbi.nlm.nih.gov/7570155/</a>	5
81	Navalho M, Resende C, Rodrigues AM, Pereira da Silva JA, Fonseca JE, Campos J, et al. Bilateral evaluation of the hand and wrist in untreated early inflammatory arthritis: a comparative study of ultrasonography and magnetic resonance imaging. J Rheumatol. 2013;408:1282-92. <a href="https://pubmed.ncbi.nlm.nih.gov/23729806/">https://pubmed.ncbi.nlm.nih.gov/23729806/</a>	4
82	Kransdorf MJ, Murphey MD. Radiologic evaluation of soft-tissue masses: a current perspective. AJR Am J Roentgenol. 2000;1753:575-87. https://pubmed.ncbi.nlm.nih.gov/10954433/	5
83	Kransdorf MJ, Jelinek JS, Moser RP, Jr., Utz JA, Brower AC, Hudson TM, et al. Soft-tissue masses: diagnosis using MR imaging. AJR Am J Roentgenol. 1989;1533:541-7 <a href="https://pubmed.ncbi.nlm.nih.gov/2763953/">https://pubmed.ncbi.nlm.nih.gov/2763953/</a>	4
84	Chang AE, Matory YL, Dwyer AJ, Hill SC, Girton ME, Steinberg SM, et al. Magnetic resonance imaging versus computed tomography in the evaluation of soft tissue tumors of the extremities. Ann Surg. 1987;2054:340-8. https://pubmed.ncbi.nlm.nih.gov/3032120/	4
85	Berquist TH, Ehman RL, King BF, Hodgman CG, Ilstrup DM. Value of MR imaging in differentiating benign from malignant soft-tissue masses: study of 95 lesions. AJR Am J Roentgenol. 1990;1556:1251-5 <a href="https://pubmed.ncbi.nlm.nih.gov/2122675/">https://pubmed.ncbi.nlm.nih.gov/2122675/</a>	4
86	Herrlin K, Ling LB, Pettersson H, Willen H, Rydholm A. Gadolinium-DTPA enhancement of soft tissue tumors in magnetic resonance imaging. Acta Radiol. 1990;313:233-6. <a href="https://pubmed.ncbi.nlm.nih.gov/2386637/">https://pubmed.ncbi.nlm.nih.gov/2386637/</a>	5 Small Series

87	Totty WG, Murphy WA, Lee JK. Soft-tissue tumors: MR imaging. Radiology. 1986;1601:135-41. https://pubmed.ncbi.nlm.nih.gov/3715024/	4
88	De Schepper AM, De Beuckeleer L, Vandevenne J, Somville J. Magnetic resonance imaging of soft tissue tumors. Eur Radiol. 2000;102:213-23. https://pubmed.ncbi.nlm.nih.gov/10663750/	5
89	Sundaram M, McGuire MH, Herbold DR. Magnetic resonance imaging of soft tissue masses: an evaluation of fifty-three histologically proven tumors. Magn Reson Imaging. 1988;63:237-48. https://pubmed.ncbi.nlm.nih.gov/3398729/	4
90	Gielen JL, De Schepper AM, Vanhoenacker F, Parizel PM, Wang XL, Sciot R, et al. Accuracy of MRI in characterization of soft tissue tumors and tumor-like lesions. A prospective study in 548 patients. Eur Radiol. 2004;1412:2320-30. <a href="https://pubmed.ncbi.nlm.nih.gov/15290067/">https://pubmed.ncbi.nlm.nih.gov/15290067/</a>	4
91	Kransdorf MJ, Murphey MD. The use of gadolinium in the MR evaluation of soft tissue tumors. Semin Ultrasound CT MR. 1997;184:251-68. https://pubmed.ncbi.nlm.nih.gov/9285993/	5
92	Heiken JP, Lee JK, Smathers RL, Totty WG, Murphy WA. CT of benign soft-tissue masses of the extremities. AJR Am J Roentgenol. 1984;1423:575-80 https://pubmed.ncbi.nlm.nih.gov/9285993/	4
93	Mori T, Fujii M, Akisue T, Yamamoto T, Kurosaka M, Sugimura K. Three-dimensional images of contrast-enhanced MDCT for preoperative assessment of musculoskeletal masses: comparison with MRI and plain radiographs. Radiat Med. 2005;236:398-406. https://pubmed.ncbi.nlm.nih.gov/16389981/	5
94	Kahn JH, Mehta SD. The role of post-reduction radiographs after shoulder dislocation. J Emerg Med. 2007;332:169-73. https://pubmed.ncbi.nlm.nih.gov/17692769/	4
95	Emond M, Le Sage N, Lavoie A, Moore L. Refinement of the Quebec decision rule for radiography in shoulder dislocation. Cjem. 2009;111:36-43. https://pubmed.ncbi.nlm.nih.gov/19166638/	4
96	De Smet AA. Anterior oblique projection in radiography of the traumatized shoulder. AJR Am J Roentgenol. 1980;1343:515-8. <a href="https://pubmed.ncbi.nlm.nih.gov/6766616/">https://pubmed.ncbi.nlm.nih.gov/6766616/</a>	5

97	Murachovsky J, Bueno RS, Nascimento LG, Almeida LH, Strose E, Castiglia MT, et al. Calculating anterior glenoid bone loss using the Bernageau profile view. Skeletal Radiol. 2012;4110:1231-7. <a href="https://pubmed.ncbi.nlm.nih.gov/22639204/">https://pubmed.ncbi.nlm.nih.gov/22639204/</a>	4
98	Griffith JF, Yung PS, Antonio GE, Tsang PH, Ahuja AT, Chan KM. CT compared with arthroscopy in quantifying glenoid bone loss. AJR Am J Roentgenol. 2007;1896:1490-3. <a href="https://pubmed.ncbi.nlm.nih.gov/18029890/">https://pubmed.ncbi.nlm.nih.gov/18029890/</a>	4
99	Lee RK, Griffith JF, Tong MM, Sharma N, Yung P. Glenoid bone loss: assessment with MR imaging. Radiology. 2013;2672:496-502. https://pubmed.ncbi.nlm.nih.gov/23329661/	4
100	e Souza PM, Brandao BL, Brown E, Motta G, Monteiro M, Marchiori E. Recurrent anterior glenohumeral instability: the quantification of glenoid bone loss using magnetic resonance imaging. Skeletal Radiol. 2014;438:1085-92. https://pubmed.ncbi.nlm.nih.gov/24805966/	4
101	Chen KC, Chen JY. All About Shoulder Arthroplasty: What Radiologists Should Know. Semin Musculoskelet Radiol. 2019;232:126-40. https://pubmed.ncbi.nlm.nih.gov/30925626/	5
102	de Jesus JO, Parker L, Frangos AJ, Nazarian LN. Accuracy of MRI, MR arthrography, and ultrasound in the diagnosis of rotator cuff tears: a meta-analysis. AJR Am J Roentgenol. 2009;1926:1701-7. https://pubmed.ncbi.nlm.nih.gov/19457838/	Pending
103	Vlychou M, Dailiana Z, Fotiadou A, Papanagiotou M, Fezoulidis IV, Malizos K. Symptomatic partial rotator cuff tears: diagnostic performance of ultrasound and magnetic resonance imaging with surgical correlation. Acta Radiol. 2009;501:101-5. <a href="https://pubmed.ncbi.nlm.nih.gov/19052931/">https://pubmed.ncbi.nlm.nih.gov/19052931/</a>	4
104	Kassarjian A, Bencardino JT, Palmer WE. MR imaging of the rotator cuff. Magn Reson Imaging Clin N Am. 2004;121:39-60, vi. <a href="https://pubmed.ncbi.nlm.nih.gov/15066592/">https://pubmed.ncbi.nlm.nih.gov/15066592/</a>	5
105	Teefey SA, Rubin DA, Middleton WD, Hildebolt CF, Leibold RA, Yamaguchi K. Detection and quantification of rotator cuff tears. Comparison of ultrasonographic, magnetic resonance imaging, and arthroscopic findings in seventy-one consecutive cases. J Bone Joint Surg Am. 2004;864:708-16. https://pubmed.ncbi.nlm.nih.gov/15069134/	4



106	Lenza M, Buchbinder R, Takwoingi Y, Johnston RV, Hanchard NC, Faloppa F. Magnetic resonance imaging, magnetic resonance arthrography and ultrasonography for assessing rotator cuff tears in people with shoulder pain for whom surgery is being considered. Cochrane Database Syst Rev. 20139:Cd009020. <a href="https://pubmed.ncbi.nlm.nih.gov/24065456/">https://pubmed.ncbi.nlm.nih.gov/24065456/</a>	2
107	Fotiadou AN, Vlychou M, Papadopoulos P, Karataglis DS, Palladas P, Fezoulidis IV. Ultrasonography of symptomatic rotator cuff tears compared with MR imaging and surgery. Eur J Radiol. 2008;681:174-9. <a href="https://pubmed.ncbi.nlm.nih.gov/18160242/">https://pubmed.ncbi.nlm.nih.gov/18160242/</a>	4
108	Zlatkin MB, Iannotti JP, Roberts MC, Esterhai JL, Dalinka MK, Kressel HY, et al. Rotator cuff tears: diagnostic performance of MR imaging. Radiology. 1989;1721:223-9.	4
109	Apostolopoulos AP, Angelis S, Yallapragada RK, Khan S, Nadjafi J, Balfousias T, et al. The Sensitivity of Magnetic Resonance Imaging and Ultrasonography in Detecting Rotator Cuff Tears. Cureus. 2019;115:e4581. https://pubmed.ncbi.nlm.nih.gov/31293841/	4
110	Bradley MP, Tung G, Green A. Overutilization of shoulder magnetic resonance imaging as a diagnostic screening tool in patients with chronic shoulder pain. J Shoulder Elbow Surg. 2005;143:233-7. <a href="https://pubmed.ncbi.nlm.nih.gov/15889019/">https://pubmed.ncbi.nlm.nih.gov/15889019/</a>	4
111	Sharma P, Morrison WB, Cohen S. Imaging of the shoulder with arthroscopic correlation. Clin Sports Med. 2013;323:339-59. <a href="https://pubmed.ncbi.nlm.nih.gov/23773872/">https://pubmed.ncbi.nlm.nih.gov/23773872/</a>	5
112	Bearcroft PW, Blanchard TK, Dixon AK, Constant CR. An assessment of the effectiveness of magnetic resonance imaging of the shoulder: literature review. Skeletal Radiol. 2000;2912:673-9 <a href="https://pubmed.ncbi.nlm.nih.gov/11271547/">https://pubmed.ncbi.nlm.nih.gov/11271547/</a>	4
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