American College of Radiology
ACR Appropriateness Criteria®

Thoracic Back Pain

Variant 1: Adult. Acute thoracic back pain without myelopathy or radiculopathy. No red flags. No prior management. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Bone scan whole body	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	19	0	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	18	1	0	0	0	0	0	0	0
Radiography thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv		1	1	15	0	2	1	0	0	0	1	0
CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	0	0	1	1	0	1	0	0
CT thoracic spine without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	18	0	1	0	0	0	0	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	15	1	0	1	1	0	1	0	0
MRI thoracic spine without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	1	1	1	2	1	0	0	0
MRI thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	1	0	1	1	0	0	0	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	1	1	1	0	0	0	0

CT myelography thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		1	1	17	0	0	2	0	0	0	0	0
Bone scan with SPECT or SPECT/CT thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0

Variant 2: Adult. Subacute or chronic thoracic back pain without myelopathy or radiculopathy. No red flags. Failed conservative management. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography thoracic spine	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv		5	5	11	4	1	0	0	1	2	0	0
Bone scan whole body	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	18	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	17	0	2	0	0	0	0	0	0
CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	15	0	1	1	2	0	0	0	0
CT thoracic spine without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	1	1	0	1	0	0	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	14	1	0	1	2	1	0	0	0
MRI thoracic spine without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	13	3	1	0	0	1	1	0	0
MRI thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	12	1	0	2	2	0	1	1	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	14	1	1	0	2	0	1	0	0

CT myelography thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		1	1	16	0	1	1	0	0	1	0	0
Bone scan with SPECT or SPECT/CT thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0

Variant 3: Adult. Thoracic back pain with myelopathy or radiculopathy. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI thoracic spine without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	1	3	3	4	8
References				Study Quality											
20 (22048067)				4											
33 (31304197)				4											
CT thoracic spine without IV contrast	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	3	0	0	5	8	3	0	0	0
MRI thoracic spine without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	2	0	1	0	1	0	8	4	3
CT myelography thoracic spine	May be appropriate	Limited	☢☢☢☢ 10-30 mSv		5	5	0	0	1	1	14	3	0	0	0
References				Study Quality											
32 (28338452)				4											
Radiography thoracic spine	May be appropriate	Limited	☢☢☢ 1-10 mSv		4	4	2	1	1	6	7	2	0	0	0
References				Study Quality											
11 (19412022)				1											
Bone scan whole body	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	17	2	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	4	0	0	0	0	0
CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	15	0	2	0	2	0	0	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	1	1	0	1	0	0	0	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	0	3	0	0	0	0	0	0
Bone scan with SPECT or SPECT/CT thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	17	0	2	0	0	0	0	0	0

Variant 4: Adult. Thoracic back pain without or with myelopathy or radiculopathy. One or more of the following: low-velocity trauma, osteoporosis, elderly individual, or chronic steroid use. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography thoracic spine	Usually appropriate	Limited	☢☢☢ 1-10 mSv		7	7	0	0	1	0	1	0	13	2	2
		References		Study Quality											
		36 (15875926)		2											
CT thoracic spine without IV contrast	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	7	0	0	0	1	4	3	5	2	4
		References		Study Quality											
		36 (15875926)		2											
MRI thoracic spine without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	2	3	4	2	7
		References		Study Quality											
		36 (15875926)		2											

MRI thoracic spine without and with IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	2	0	1	3	11	2	0	0	0
Bone scan whole body	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	7	1	0	4	7	0	0	0	0
		References		Study Quality											
		36 (15875926)		2											
Bone scan with SPECT or SPECT/CT thoracic spine	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	8	0	0	3	6	2	0	0	0
		References		Study Quality											
		36 (15875926)		2											
FDG-PET/CT skull base to mid-thigh	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	1	1	1	0	0	0	0	0
CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	12	0	3	2	0	1	1	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	18	0	1	0	0	0	0	0	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	11	0	4	2	0	2	0	0	0
CT myelography thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		1	1	11	2	2	2	1	0	1	0	0

Variant 5: Adult. Thoracic back pain without or with myelopathy or radiculopathy. One or more of the following: suspicion of cancer, infection, or immunosuppression. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI thoracic spine without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	1	0	0	0	0	2	3	13

References	Study Quality
38 (2028061)	1
39 (18278491)	3
41 (22312523)	4
40 (19325068)	4
36 (15875926)	2
42 (28677897)	4

MRI thoracic spine without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	2	3	8	2	3

References	Study Quality
39 (18278491)	3
43 (29431498)	4
41 (22312523)	4
40 (19325068)	4
44 (32904056)	1
42 (28677897)	4

Radiography thoracic spine	May be appropriate	Limited	☢☢☢ 1-10 mSv		5	5	1	0	0	2	12	4	0	0	0

References	Study Quality
45 (31100530)	4

CT thoracic spine without IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	0	1	1	12	5	0	0	0

References	Study Quality
37 (35189892)	2

CT myelography thoracic spine	May be appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		5	5	1	0	1	3	12	2	0	0	0
Bone scan whole body	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	2	2	0	3	2	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	17	0	1	0	1	0	0	0	0

CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	1	2	0	0	0	0	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	3	0	0	0	0	0	0	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	2	0	0	0	0	0	0
Bone scan with SPECT or SPECT/CT thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	11	1	1	1	3	1	1	0	0

Variant 6: Adult. Thoracic back pain without or with myelopathy or radiculopathy. Radiograph shows bone destruction or fracture or spinal deformity. 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 thoracic spine without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	1	0	1	1	3	3	10
	References			Study Quality											
	44 (32904056)			1											
CT thoracic spine without IV contrast	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	7	0	0	0	0	3	2	7	5	2
	References			Study Quality											
	11 (19412022)			1											
	46 (33302988)			4											
MRI thoracic spine without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	3	2	5	4	4
	References			Study Quality											
	27 (33934648)			2											
CT myelography thoracic spine	May be appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		5	5	0	0	0	1	12	5	1	0	0

Bone scan whole body	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	13	2	0	2	1	1	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	17	0	2	0	0	0	0	0	0
CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	15	1	2	0	1	0	0	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	12	0	2	3	2	0	0	0	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	16	2	1	0	0	0	0	0	0
Bone scan with SPECT or SPECT/CT thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	14	1	0	0	4	0	0	0	0

Variant 7: Adult. Thoracic back pain without or with myelopathy or radiculopathy. Post thoracic spine surgery. Follow-up imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography thoracic spine	Usually appropriate	Expert Consensus	☢☢☢ 1-10 mSv		7	7	0	0	0	0	1	0	13	3	2
CT thoracic spine without IV contrast	Usually appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	7	0	0	0	0	4	5	2	6	2
MRI thoracic spine without IV contrast	Usually appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	3	6	5	3
MRI thoracic spine without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	1	1	4	4	3	6

References	Study Quality
47 (33222899)	4
46 (33302988)	4

CT myelography thoracic spine	May be appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		6	6	0	1	1	0	5	6	4	2	0
Bone scan whole body	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	17	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	16	1	1	0	1	0	0	0	0
CT thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	16	1	2	0	0	0	0	0	0
CT thoracic spine without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	17	0	1	1	0	0	0	0	0
MRI thoracic spine with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	17	0	2	0	0	0	0	0	0
Bone scan with SPECT or SPECT/CT thoracic spine	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	12	1	3	2	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.**