American College of Radiology
ACR Appropriateness Criteria®

Stress (Fatigue/Insufficiency) Fracture, Including Sacrum, Excluding Other Vertebrae

Variant 1: Suspected stress (fatigue) fracture, excluding vertebrae. First imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography area of interest	Usually appropriate		Varies	Varies	9	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT area of interest	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 2: Suspected stress (fatigue) fracture, hip. Negative radiographs. 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 hip without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT hip	May be appropriate		☢☢☢ 1-10 mSv		6	n/a	0	0	0	0	0	0	0	0	0
CT hip without IV contrast	May be appropriate		☢☢☢ 1-10 mSv		5	n/a	0	0	0	0	0	0	0	0	0
Radiography hip repeat in 10-14 days	May be appropriate		☢☢☢ 1-10 mSv		5	n/a	0	0	0	0	0	0	0	0	0
MRI hip without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT hip without and with IV contrast	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
CT hip with IV contrast	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
US hip	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 3: Suspected stress (fatigue) fracture, excluding hip and vertebrae. Negative radiographs. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography area of interest repeat in 10-14 days	Usually appropriate		Varies	Varies	9	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	May be appropriate		Varies	Varies	5	n/a	0	0	0	0	0	0	0	0	0

Tc-99m bone scan whole body with SPECT area of interest	May be appropriate		☢☢☢ 1-10 mSv		5	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 4: Suspected stress (fatigue) fracture, excluding vertebrae. Negative radiographs. Immediate "need-to-know" diagnosis. 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 area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	May be appropriate		Varies	Varies	5	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT area of interest	May be appropriate		☢☢☢ 1-10 mSv		5	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
Radiography area of interest	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 5: Confirmed stress (fatigue) fracture, excluding vertebrae. Follow-up imaging study for "return-to-play" evaluation.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
DXA total body composition	May be appropriate		☢ <0.1 mSv	☢ <0.03 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	May be appropriate		Varies	Varies	4	n/a	0	0	0	0	0	0	0	0	0
Radiography area of interest repeat in 10-14 days	Usually not appropriate		Varies	Varies	3	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT area of interest	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 6: Suspected stress (insufficiency) fracture, pelvis or hip. First imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography area of interest	Usually appropriate		Varies	Varies	9	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	3	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT area of interest	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 7: Suspected stress (insufficiency) fracture, pelvis or hip. Negative radiographs. 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 area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	Usually appropriate		Varies	Varies	7	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT area of interest	May be appropriate		☢☢☢ 1-10 mSv		6	n/a	0	0	0	0	0	0	0	0	0

Radiography area of interest repeat in 10-14 days	May be appropriate		Varies	Varies	4	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 8: Suspected stress (insufficiency) fracture of lower extremity, excluding pelvis and hip. First imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography lower extremity area of interest (not pelvis or hip)	Usually appropriate		☢ <0.1 mSv	☢☢ 0.03-0.3 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
US lower extremity area of interest (not pelvis or hip)	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI lower extremity area of interest (not pelvis or hip) without IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI lower extremity area of interest (not pelvis or hip) without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT lower extremity area of interest (not pelvis or hip) without IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT lower extremity area of interest (not pelvis or hip) without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0

CT lower extremity area of interest (not pelvis or hip) with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT lower extremity area of interest	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0

Variant 9: Suspected stress (insufficiency) fracture of lower extremity, excluding pelvis and hip. Negative radiographs. 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 lower extremity area of interest (not pelvis or hip) without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
Radiography lower extremity area of interest (not pelvis or hip) repeat in 10-14 days	Usually appropriate		☢ <0.1 mSv		7	n/a	0	0	0	0	0	0	0	0	0
CT lower extremity area of interest (not pelvis or hip) without IV contrast	May be appropriate		Varies	Varies	5	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT lower extremity area of interest	May be appropriate		☢☢☢ 1-10 mSv		5	n/a	0	0	0	0	0	0	0	0	0
US lower extremity area of interest (not pelvis or hip)	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI lower extremity area of interest (not pelvis or hip) without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT lower extremity area of interest (not pelvis or hip) without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT lower extremity area of interest (not pelvis or hip) with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0

Variant 10: Follow-up imaging study for characterizing nonspecific focal uptake on Tc-99m MDP bone scintigraphy, suspected to be a stress fracture.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography area of interest	Usually appropriate		Varies	Varies	9	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	May be appropriate		O 0 mSv	O 0 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	May be appropriate		Varies	Varies	5	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	2	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 11: Suspect stress (fatigue or insufficiency) fracture, pelvis or hip or sacrum. Pregnant patient.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
Radiography area of interest	May be appropriate		Varies	Varies	4	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0

CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Tc-99m bone scan whole body with SPECT area of interest	Usually not appropriate		☢☢☢ 1-10 mSv		1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 12: Suspect stress (fatigue or insufficiency) fracture of the long bones. Pregnant patient.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography area of interest	Usually appropriate		Varies	Varies	9	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without IV contrast	Usually appropriate		O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest without and with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
CT area of interest with IV contrast	Usually not appropriate		Varies	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRI area of interest without and with IV contrast	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US area of interest	Usually not appropriate		O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	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.**