

American College of Radiology ACR Appropriateness Criteria®

Head Trauma-Child

Variant 1: Child. Minor acute blunt head trauma. Very low risk for clinically important brain injury per PECARN criteria. Excluding suspected abusive head trauma. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
CTA head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	1	0
CT head with IV contrast	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	18	0	0	0	0	0	0	0	1	0
			References	Study Quality												
			15 (27488722)	3												
			31 (26584662)	3												
			12 (24927811)	4												
			16 (24431418)	3												
			5 (19758692)	2												
			14 (24635987)	1												
CT head without IV contrast	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	12	2	2	0	2	0	0	0	0	1
			References	Study Quality												
			15 (27488722)	3												
			31 (26584662)	3												
			12 (24927811)	4												
			16 (24431418)	3												
			5 (19758692)	2												

		14 (24635987)		1													
CT head without and with IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0	1	
		References	Study Quality														
		15 (27488722)	3														
		31 (26584662)	3														
		12 (24927811)	4														
		16 (24431418)	3														
		5 (19758692)	2														
		14 (24635987)	1														
Arteriography cerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0	1	
MRA head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	1	0	0	0	0	0	0	1	0	
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	1	0	0	0	0	0	0	1	0	
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	1	1	1	3	0	0	0	0	0	
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	16	1	1	0	0	0	0	0	1	0	
Radiography skull	Usually not appropriate	Limited	☼ <0.1 mSv	☼☼ 0.03-0.3 mSv [ped]	1	1	16	0	1	0	1	0	0	0	1	0	
		References	Study Quality														
		2 (22273264)	4														
		33 (20495486)	4														
		9 (17056862)	3														

Variant 2: Child. Minor acute blunt head trauma. Intermediate risk for clinically important brain injury per PECARN criteria. Excluding suspected abusive head trauma. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	May be appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	6	6	1	1	0	1	6	9	1	1	1
		References 5 (19758692)		Study Quality 2											
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	10	7	2	2	0	0	0	0	0
CTA head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	12	2	2	1	1	0	0	0	1
CT head with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	16	2	0	0	0	0	0	1	0
		References 5 (19758692)		Study Quality 2											
CT head without and with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	16	2	0	0	0	0	0	1	0
		References 5 (19758692)		Study Quality 2											
Arteriography cerebral	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	1
MRA head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	14	1	0	2	1	0	0	0	1
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	1	0	0	2	0	0	0	1
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	14	0	1	1	2	1	0	0	0

Radiography skull	Usually not appropriate	Limited	☼ <0.1 mSv	☼☼☼ 0.03-0.3 mSv [ped]	1	1	19	2	0	0	0	0	0	0	0	
			References	Study Quality												
			2 (22273264)	4												
			33 (20495486)	4												
			9 (17056862)	3												

Variant 3: Child. Minor acute blunt head trauma. High risk for clinically important brain injury per PECARN criteria. Excluding suspected abusive head trauma. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head without IV contrast	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 0.3-3 mSv [ped]	9	9	0	0	0	0	0	0	0	2	19
			References	Study Quality											
			5 (19758692)	2											
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	10	2	4	3	2	0	0	0	0
CTA head with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	15	3	1	2	0	0	0	0	0
			References	Study Quality											
			34 (22172317)	4											
			35 (21908994)	4											
			19 (21318614)	4											
CT head with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	19	1	1	0	0	0	0	0	0
			References	Study Quality											
			5 (19758692)	2											

CT head without and with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	20	1	0	0	0	0	0	0	0
		References		Study Quality											
		5 (19758692)		2											
Arteriography cerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	20	1	0	0	0	0	0	0	0
MRA head without IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	15	3	2	1	0	0	0	0	0
		References		Study Quality											
		34 (22172317)		4											
		35 (21908994)		4											
		19 (21318614)		4											
MRA head without and with IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	19	2	0	0	0	0	0	0	0
		References		Study Quality											
		34 (22172317)		4											
		35 (21908994)		4											
		19 (21318614)		4											
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	2	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Limited	☼ <0.1 mSv	☼☼ 0.03-0.3 mSv [ped]	1	1	18	3	0	0	0	0	0	0	0
		References		Study Quality											
		2 (22273264)		4											
		33 (20495486)		4											
		9 (17056862)		3											

Variant 4: Child. Moderate or severe acute blunt head trauma (GCS less than or equal to 13). Excluding suspected abusive head trauma. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
CT head without IV contrast	Usually appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	9	9	1	0	0	0	0	0	0	0	0	18
		References	Study Quality													
		36 (18022444)	4													
MRI head without IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	3	3	7	3	6	3	1	1	0	0	0	
		References	Study Quality													
		25 (19852541)	2													
		39 (17437903)	2													
CTA head with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	14	2	3	2	0	0	0	0	0	
		References	Study Quality													
		37 (19760434)	4													
		19 (21318614)	4													
		38 (28916852)	4													
CT head with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	15	1	2	0	0	1	0	0	0	
		References	Study Quality													
		36 (18022444)	4													
CT head without and with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	15	1	1	0	1	0	1	0	0	
		References	Study Quality													
		36 (18022444)	4													
Arteriography cerebral	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	15	0	3	0	0	0	0	0	1	
MRA head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	14	1	5	1	0	0	0	0	0	

MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	3	0	0	0	0	0	0	
MRI head without and with IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	1	1	0	0	0	0	0	
		References	Study Quality													
		25 (19852541)	2													
		39 (17437903)	2													
Radiography skull	Usually not appropriate	Limited	⊕ <0.1 mSv	⊕⊕ 0.03-0.3 mSv [ped]	1	1	19	0	0	1	1	0	0	0	0	
		References	Study Quality													
		2 (22273264)	4													
		33 (20495486)	4													
		9 (17056862)	3													

Variant 5: Child. Subacute blunt head trauma with cognitive or neurologic signs.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations									
							1	2	3	4	5	6	7	8	9	
CT head without IV contrast	Usually appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	8	8	0	1	0	0	0	1	3	7	9	
		References	Study Quality													
		43 (24064865)	3													
		44 (29784284)	3													
MRI head without IV contrast	Usually appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	8	8	1	0	0	0	0	0	2	9	9	
		References	Study Quality													
		28 (26381555)	2													
		31 (26584662)	3													
		29 (25700122)	2													

Arteriography cerebral	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	16	0	1	1	0	0	1	0	0
Radiography skull	Usually not appropriate	Expert Consensus	☹ <0.1 mSv	☹☹ 0.03-0.3 mSv [ped]	1	1	17	0	0	0	0	1	0	0	1

Variant 6: Child. Chronic blunt head trauma with new or progressive cognitive or neurologic deficits. Excluding suspected abusive head trauma and post-traumatic seizure.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI head without IV contrast	Usually appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	9	9	0	0	0	0	0	0	1	4	16
		References		Study Quality											
		47 (28095029)		3											
		49 (27482782)		4											
		45 (28490224)		4											
		41 (29157852)		4											
		46 (26419243)		4											
CT head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	5	5	7	2	7	2	0	1	0	0	2
		References		Study Quality											
		47 (28095029)		3											
		46 (26419243)		4											
MRA head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ 0 mSv	○ 0 mSv [ped]	5	5	6	1	0	8	3	3	0	0	0
MRI head without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ 0 mSv	○ 0 mSv [ped]	5	5	10	1	5	2	0	2	0	0	1
		References		Study Quality											
		47 (28095029)		3											

49 (27482782)	4
45 (28490224)	4
41 (29157852)	4
46 (26419243)	4

MRI head without IV contrast with DTI	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	8	1	8	1	0	1	0	1	1
CTA head with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	2	2	9	2	2	2	3	1	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	8	2	1	3	3	1	0	1	0
CT head with IV contrast	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	1	1	14	1	1	1	0	0	1	1	0

References	Study Quality
47 (28095029)	3
46 (26419243)	4

CT head without and with IV contrast	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	20	0	0	1	0	0	0	0	0
References	Study Quality														
47 (28095029)	3														
46 (26419243)	4														

Arteriography cerebral	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	14	3	1	0	0	0	0	1	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	10	3	1	0	4	1	0	0	0

References	Study Quality
51 (29560308)	4
52 (28085565)	4

MR spectroscopy head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	10	2	0	3	2	2	0	0	0
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		References	Study Quality												
		50 (24735414)	3												
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	10	2	1	3	1	1	0	1	0
Radiography skull	Usually not appropriate	Limited	☼ <0.1 mSv	☼☼ 0.03-0.3 mSv [ped]	1	1	17	0	0	0	1	0	0	0	1
		References	Study Quality												
		48 (-3149364)	4												

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.