



11 (16189364)	2
8 (20093524)	3
13 (21563330)	4
15 (19027497)	4
12 (29753518)	1
7 (21835403)	4
14 (30065073)	4
3 (32370957)	4

CT head without and with IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	16	3	0	0	0	0	0	0	0
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References	Study Quality
9 (10891517)	3
10 (11356436)	3
4 (16189365)	3
11 (16189364)	2
8 (20093524)	3
13 (21563330)	4
15 (19027497)	4
12 (29753518)	1
7 (21835403)	4
14 (30065073)	4
3 (32370957)	4

CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0

MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	16	0	2	1	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	1	0	0	0	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
HMPAO SPECT or SPECT/CT brain	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 brain	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv	⊗⊗⊗⊗ 3-10 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	⊗ <0.1 mSv	⊗⊗ 0.03-0.3 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	⊗ <0.1 mSv	⊗⊗ 0.03-0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	1	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	1	1	0	0	0	0	0	0
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0

**Variant 2: Acute head trauma, mild (GCS 13-15), imaging indicated by clinical decision rule. 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	Strong	⊗⊗⊗ 1-10	⊗⊗⊗ 0.3-	9	9	0	0	0	0	1	0	5	1	12

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

References	Study Quality
17 (19809839)	2
19 (1404507)	3
2 (25456317)	4
16 (19797789)	3
18 (26176603)	4
22 (29452747)	2
27 (30054151)	2
24 (31081856)	2
20 (19306376)	4
28 (23102492)	2
23 (30447947)	2
25 (30485240)	4
7 (21835403)	4
26 (29690824)	2
29 (26607648)	1
21 (30643942)	4
5 (30547708)	4

CT head with IV contrast	Usually not appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	1	15	1	1	2	0	0	0	0	0
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References	Study Quality
17 (19809839)	2
19 (1404507)	3
2 (25456317)	4
16 (19797789)	3
18 (26176603)	4
22 (29452747)	2

27 (30054151)	2
24 (31081856)	2
20 (19306376)	4
28 (23102492)	2
23 (30447947)	2
25 (30485240)	4
7 (21835403)	4
26 (29690824)	2
29 (26607648)	1
21 (30643942)	4
5 (30547708)	4

CT head without and with IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	13	4	1	1	0	0	0	0	0
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References	Study Quality
17 (19809839)	2
19 (1404507)	3
2 (25456317)	4
16 (19797789)	3
18 (26176603)	4
22 (29452747)	2
27 (30054151)	2
24 (31081856)	2
20 (19306376)	4
28 (23102492)	2
23 (30447947)	2
25 (30485240)	4
7 (21835403)	4
26 (29690824)	2
29 (26607648)	1
21 (30643942)	4
5 (30547708)	4





FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
HMPAO SPECT or SPECT/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	0	0	0	4	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	0	1	0	0	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	0	0	2	1	1	0	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	14	0	1	2	0	1	0	1	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	15	0	0	2	1	1	0	0	0
CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	13	2	3	1	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	11	3	1	2	1	1	0	0	0

References	Study Quality
17 (19809839)	2
31 (1535893)	2
16 (19797789)	3
32 (20815050)	4
30 (28091809)	4





38 (23224915)	2
36 (9798776)	3
2 (25456317)	4
37 (19359907)	2
18 (26176603)	4
29 (26607648)	1
39 (31451409)	2

HMPAO SPECT or SPECT/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	17	0	0	1	0	0	0	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	0	0	1	0
Radiography skull	Usually not appropriate	Expert Consensus	☹ <0.1 mSv	☹☹ 0.03-0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	0	2	0	1	1	0	0	1
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	1	1	15	1	1	0	1	0	0	0	0

References	Study Quality
38 (23224915)	2
36 (9798776)	3
2 (25456317)	4

37 (19359907)	2
18 (26176603)	4
29 (26607648)	1
39 (31451409)	2

**Variant 5: Acute head trauma with unchanged neurologic examination and positive finding(s) on initial imaging (eg, subdural hematoma). Short-term follow-up 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]	7	7	0	0	0	0	4	2	10	2	1
		References	Study Quality												
		40 (23914924)	M												
		41 (24401514)	4												
		2 (25456317)	4												
		42 (22196096)	4												
MRI head without IV contrast	May be appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	5	5	0	0	0	4	11	3	1	0	0
		References	Study Quality												
		36 (9798776)	3												
		2 (25456317)	4												
		37 (19359907)	2												
		18 (26176603)	4												
		29 (26607648)	1												
CT head with IV contrast	Usually not appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	15	1	1	0	1	0	0	0	0
		References	Study Quality												
		40 (23914924)	M												
		41 (24401514)	4												
		2 (25456317)	4												

		42 (22196096)		4													
CT head without and with IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	14	2	0	0	1	1	0	0	0		
		References	Study Quality														
		40 (23914924)	M														
		41 (24401514)	4														
		2 (25456317)	4														
		42 (22196096)	4														
CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	15	0	1	1	1	0	0	0	0	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	14	0	0	1	1	2	0	0	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	13	0	0	1	2	2	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	1	1	12	0	1	2	1	1	0	1	0	0	0
		References	Study Quality														
		36 (9798776)	3														
		2 (25456317)	4														
		37 (19359907)	2														
		18 (26176603)	4														
		29 (26607648)	1														
HMPAO SPECT or SPECT/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0	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	0	0	0	0	1
Radiography skull	Usually not appropriate	Expert Consensus	⊕ <0.1 mSv	⊕⊕ 0.03-0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	14	1	0	0	2	0	0	1	0	
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	16	0	0	1	0	1	0	0	0	
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	1	0	0	0	0	0	0	
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0	
MRI head with IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	1	1	14	1	1	1	0	0	0	1	0	

References	Study Quality
36 (9798776)	3
2 (25456317)	4
37 (19359907)	2
18 (26176603)	4
29 (26607648)	1

**Variant 6: Acute head trauma with new or progressive neurologic deficit(s). Short-term follow-up 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	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	9	9	0	0	0	0	0	0	0	4	14

References	Study Quality
17 (19809839)	2

2 (25456317)	4
16 (19797789)	3
42 (22196096)	4
35 (29450470)	2

MRI head without IV contrast	May be appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	0	2	6	3	4	2	1
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References	Study Quality
36 (9798776)	3
2 (25456317)	4
37 (19359907)	2
29 (26607648)	1

MRI head without and with IV contrast	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	2	2	9	0	3	0	4	1	1	0	0
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References	Study Quality
36 (9798776)	3
2 (25456317)	4
37 (19359907)	2
29 (26607648)	1

CT head with IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	14	0	1	2	0	0	1	0	0
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References	Study Quality
17 (19809839)	2
2 (25456317)	4
16 (19797789)	3
42 (22196096)	4
35 (29450470)	2

CT head without and with IV contrast	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	12	0	1	0	4	0	1	0	0
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References	Study Quality
17 (19809839)	2

2 (25456317)	4
16 (19797789)	3
42 (22196096)	4
35 (29450470)	2

CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	10	2	0	0	4	1	1	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☼☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	15	0	0	0	2	0	1	0	0
MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	0	0	0	3	1	1	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	0	0	0	3	2	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	17	0	0	1	0	0	0	0	0
HMPAO SPECT or SPECT/CT brain	Usually not appropriate	Expert Consensus	☼☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	17	0	0	0	1	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☼☼☼☼ 1-10 mSv	☼☼☼☼☼ 3-10 mSv [ped]	1	1	17	0	0	0	1	0	0	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	0	0	1	0
Radiography skull	Usually not appropriate	Expert Consensus	☼ <0.1 mSv	☼☼ 0.03-0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	13	2	0	0	1	1	0	0	1
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	16	0	0	1	1	0	0	0	0

MRI head with IV contrast	Usually not appropriate	Strong	0 0 mSv	0 0 mSv [ped]	1	1	14	1	1	1	0	0	1	0	0	
		References		Study Quality												
		36 (9798776)		3												
		2 (25456317)		4												
		37 (19359907)		2												
		29 (26607648)		1												

**Variant 7: Subacute or chronic head trauma with unexplained cognitive or neurologic deficit(s). 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 with IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	1	13	3	1	1	0	0	0	0	0	
		References		Study Quality												
		32 (20815050)		4												
CT head without IV contrast	Usually appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	7	7	0	0	0	0	1	3	12	0	3	
		References		Study Quality												
		32 (20815050)		4												
CT head without and with IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	12	3	2	0	1	0	0	0	0	
		References		Study Quality												
		32 (20815050)		4												
CTA head and neck with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	17	2	0	0	0	0	0	0	0	
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	16	1	0	0	1	0	0	0	0	

MRA head and neck without IV contrast	Usually not appropriate	Expert Consensus	0.0 mSv	0.0 mSv [ped]	1	1	13	0	0	1	2	2	0	0	0
MRA head and neck without and with IV contrast	Usually not appropriate	Expert Consensus	0.0 mSv	0.0 mSv [ped]	1	1	12	1	0	1	3	1	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Limited	0.0 mSv	0.0 mSv [ped]	2	2	6	4	2	1	3	1	1	0	0

References	Study Quality
45 (25424870)	4
47 (20611044)	4
18 (26176603)	4
48 (28085565)	4
49 (31210098)	4

MRI head without IV contrast	Usually appropriate	Strong	0.0 mSv	0.0 mSv [ped]	9	9	1	0	0	0	0	1	2	1	13
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References	Study Quality
38 (23224915)	2
52 (9635948)	2
51 (19852541)	2
50 (24740482)	4
18 (26176603)	4
32 (20815050)	4

MRI head without and with IV contrast	Usually not appropriate	Strong	0.0 mSv	0.0 mSv [ped]	1	1	13	1	2	2	1	0	0	0	0
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References	Study Quality
38 (23224915)	2
52 (9635948)	2
51 (19852541)	2
50 (24740482)	4
18 (26176603)	4
32 (20815050)	4



			18 (26176603)			4											
			53 (29878909)			4											
			55 (27282864)			1											
MRI head with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	1	11	1	2	2	0	0	1	1	0		
			References				Study Quality										
			38 (23224915)			2											
			52 (9635948)			2											
			51 (19852541)			2											
			50 (24740482)			4											
			18 (26176603)			4											
			32 (20815050)			4											
MRA head and neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	0	1	0	0	1	0	0		

**Variant 8: Head trauma with suspected intracranial arterial injury due to clinical risk factors or positive findings on prior imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations										
							1	2	3	4	5	6	7	8	9		
CT head with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	1	1	11	2	1	2	1	1	0	1	0		
CT head without IV contrast	May be appropriate (Disagreement)	Expert Opinion	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	5	5	2	0	1	1	11	1	0	0	3		
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	1	1	11	3	1	2	1	0	0	1	0		
CTA head and neck with IV contrast	Usually appropriate	Limited	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	9	9	0	0	0	0	0	0	0	0	2	17	
			References				Study Quality										
			60 (16688051)			3											

			56 (20154559)		4													
			45 (25424870)		4													
			57 (30097750)		4													
Arteriography cervicocerebral	May be appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	6	6	0	0	1	2	6	6	2	2	0			
			References		Study Quality													
			60 (16688051)		3													
			45 (25424870)		4													
MRA head and neck without IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ ○ mSv	○ ○ mSv [ped]	5	5	0	0	2	1	8	5	1	1	1			
			References		Study Quality													
			45 (25424870)		4													
			57 (30097750)		4													
MRA head and neck without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	○ ○ mSv	○ ○ mSv [ped]	5	5	1	0	3	2	6	5	0	1	1			
			References		Study Quality													
			45 (25424870)		4													
			57 (30097750)		4													
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	19	0	0	0	0	0	0	0	0			
MRI head without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	5	4	3	3	4	0	0	0	0			
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	12	0	1	1	3	1	0	1	0			
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	19	0	0	0	0	0	0	0	0			
HMPAO SPECT or SPECT/CT brain	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 brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	19	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	☹ <0.1 mSv	☹☹ 0.03-0.3 mSv [ped]	1	1	18	0	0	0	0	0	0	0	1
Radiography skull	Usually not appropriate	Expert Consensus	☹ <0.1 mSv	☹☹ 0.03-0.3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	17	0	0	0	1	0	0	1	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	1	1	14	2	2	0	0	0	0	1	0
MRA head and neck with IV contrast	May be appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	5	5	5	1	1	2	8	1	1	0	0

References	Study Quality
45 (25424870)	4
57 (30097750)	4

**Variant 9: Head trauma with suspected intracranial venous injury due to clinical risk factors or positive findings on prior imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT head with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	1	1	11	1	2	1	2	0	0	0	1
CT head without IV contrast	May be appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	5	5	1	0	1	3	6	6	1	0	1
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	12	0	1	1	4	0	0	0	0

Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	13	2	4	0	0	0	0	0	0
MRI functional (fMRI) head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRI head without IV contrast	May be appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	5	5	4	1	1	1	10	1	1	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	10	2	4	1	1	1	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
HMPAO SPECT or SPECT/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
Radiography skull	Usually not appropriate	Expert Consensus	☹ <0.1 mSv	☹☹ 0.03-0.3 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
MRV head without IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	6	6	0	0	1	1	5	4	7	1	0

References	Study Quality
58 (25086806)	4

MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	1	1	15	1	0	0	1	0	0	1	0
CTV head with IV contrast	Usually appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	9	9	0	0	0	0	0	0	0	2	16

References	Study Quality
58 (25086806)	4
61 (28448419)	2

MRV head without and with IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	6	6	1	0	0	1	7	4	5	1	0
		References	Study Quality												
		58 (25086806)	4												
MRV head with IV contrast	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	5	4	0	1	2	6	4	2	0	0
		References	Study Quality												
		58 (25086806)	4												
MRI head with IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	12	1	2	1	0	1	0	1	0

**Variant 10: Head trauma with suspected cerebrospinal fluid (CSF) leak. Initial imaging.**

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT temporal bone with IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv		1	1	12	1	2	0	1	1	0	0	1
		References	Study Quality												
		58 (25086806)	4												
		65 (10319986)	3												
		66 (12087336)	3												
		64 (29910174)	4												
CT temporal bone without IV contrast	Usually appropriate	Limited	☹☹☹ 1-10 mSv		8	n/a	0	0	0	0	0	0	0	0	0
		References	Study Quality												
		58 (25086806)	4												
		65 (10319986)	3												
		66 (12087336)	3												
		64 (29910174)	4												





MRI head without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	1	1	10	2	6	0	1	0	0	0	0
		References	Study Quality												
		66 (12087336)	3												
		64 (29910174)	4												
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MR spectroscopy head without IV contrast	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
HMPAO SPECT or SPECT/CT brain	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	0	0
FDG-PET/CT brain	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	18	0	0	0	0	0	0	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	0	0	0	1
MRI head without IV contrast with DTI	Usually not appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	1	1	16	0	0	1	0	0	0	1	0
CT head cisternography	May be appropriate	Limited	☼☼☼ 1-10 mSv		5	n/a	0	0	0	0	0	0	0	0	0
		References	Study Quality												
		58 (25086806)	4												
		64 (29910174)	4												
CT head cisternography	May be appropriate	Limited	☼☼☼ 1-10 mSv		5	5	0	0	0	2	10	4	2	1	0
		References	Study Quality												
		58 (25086806)	4												
		64 (29910174)	4												
DTPA cisternography	May be appropriate	Limited	☼☼☼ 1-10 mSv		4	4	0	1	1	8	7	2	0	0	0

References	Study Quality
65 (10319986)	3
66 (12087336)	3

MRI head with IV contrast	Usually not appropriate	Limited	0.0 mSv	0.0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0	0
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References	Study Quality
66 (12087336)	3
64 (29910174)	4

MRI head with IV contrast	Usually not appropriate	Limited	0.0 mSv	0.0 mSv [ped]	1	1	11	1	1	1	3	1	0	0	0
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References	Study Quality
66 (12087336)	3
64 (29910174)	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](http://www.acr.org/ac).