American College of Radiology
ACR Appropriateness Criteria®

Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage

Variant 1: Known acute subarachnoid hemorrhage (SAH) on CT. Next imaging study.

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 appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
4 (20935079)	M
13 (20729022)	2
15 (18065510)	2
20 (19942709)	3
19 (28201559)	2
18 (27060510)	2
10 (23142024)	2
17 (21839961)	1
16 (21990653)	2
14 (25194636)	Good

Arteriography cervicocerebral	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
12 (27659193)	4
11 (26338924)	4
10 (23142024)	2

MRA head without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	21 (24326447)		Good												
	22 (24495263)		2												
	23 (21529794)		2												
MRI head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	25 (21174171)		4												
	24 (20051974)		2												
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	1 (31685104)		4												
CT head without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	1 (31685104)		4												
CT head without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	1 (31685104)		4												
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
21 (24326447)	Good
22 (24495263)	2
23 (21529794)	2

MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
25 (21174171)	4
24 (20051974)	2

MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
21 (24326447)	Good
22 (24495263)	2

		23 (21529794)		2												
MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		25 (21174171)		4												
		24 (20051974)		2												

Variant 2: Suspected cerebral vasospasm. 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 appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		33 (20884748)		M											
		36 (18080806)		4											
Arteriography cervicocerebral	Usually appropriate	Moderate	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		28 (25468878)		4											
		6 (22556195)		4											
		31 (21350201)		1											
US duplex Doppler transcranial	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											

		40 (26495942)		Good												
		41 (21633870)		2												
CT head without IV contrast	May be appropriate	Moderate	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		35 (28365434)		Good												
CT head perfusion with IV contrast	May be appropriate	Strong	☢☢☢ 1-10 mSv	Varies	5	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		33 (20884748)		M												
		32 (29058091)		2												
		28 (25468878)		4												
		29 (23982597)		2												
		26 (21748499)		4												
		34 (24200901)		4												
MRI head without IV contrast	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	4	n/a	0	0	0	0	0	0	0	0	0
MRI head perfusion with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		38 (29439196)		4												
		39 (29611451)		2												
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Moderate	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		35 (28365434)		Good												

CT head without and with IV contrast	Usually not appropriate	Moderate	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	35 (28365434)		Good												
MRA head without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	37 (20532584)		2												
MRA head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	37 (20532584)		2												
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												

		37 (20532584)			2											
MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 3: Known cerebral aneurysm; untreated. Surveillance monitoring.

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 appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		4 (20935079)		M											
		13 (20729022)		2											
		15 (18065510)		2											
		19 (28201559)		2											
		18 (27060510)		2											
		10 (23142024)		2											
		17 (21839961)		1											
		16 (21990653)		2											
		14 (25194636)		Good											
MRA head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		21 (24326447)		Good											
		45 (25463352)		1											
		22 (24495263)		2											

		23 (21529794)		2												
Arteriography cervicocerebral	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
MRA head with IV contrast	May be appropriate	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		21 (24326447)		Good												
		45 (25463352)		1												
		22 (24495263)		2												
		23 (21529794)		2												
MRA head without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	4	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		21 (24326447)		Good												
		45 (25463352)		1												
		22 (24495263)		2												
		23 (21529794)		2												
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 4: Known cerebral aneurysm; previously treated. Surveillance monitoring.

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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Arteriography cervicocerebral	Usually appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
MRA head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
58 (24008171)	M
60 (25352582)	3
62 (29440326)	3
63 (27102311)	1
61 (25999378)	2
59 (23012464)	2

CTA head with IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
55 (30143820)	1
57 (30219936)	2
53 (28580532)	2
54 (26329465)	2
56 (21125478)	2

MRA head without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
58 (24008171)	M
60 (25352582)	3
62 (29440326)	3
63 (27102311)	1
61 (25999378)	2
59 (23012464)	2

MRA head with IV contrast	May be appropriate	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
58 (24008171)	M
60 (25352582)	3
62 (29440326)	3
63 (27102311)	1
61 (25999378)	2
59 (23012464)	2

CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 5: High-risk cerebral aneurysm screening.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRA head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		21 (24326447)		Good											
		22 (24495263)		2											
		23 (21529794)		2											
CTA head with IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
4 (20935079)	M
13 (20729022)	2
15 (18065510)	2
19 (28201559)	2
18 (27060510)	2
10 (23142024)	2
17 (21839961)	1
16 (21990653)	2
14 (25194636)	Good

CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	Varies	1	n/a	0	0	0	0	0	0	0	0	0
Arteriography cervicocerebral	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
21 (24326447)	Good
22 (24495263)	2
23 (21529794)	2

MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
21 (24326447)	Good
22 (24495263)	2
23 (21529794)	2

MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

Variant 6: Known high-flow vascular malformation (AVM/AVF). Surveillance monitoring.

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 appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
87 (21402614)	2
86 (22705129)	4

Arteriography cervicocerebral	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
84 (28746939)	4
85 (23615081)	2

MRA head without IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
95 (24029646)	1
97 (19833802)	2
88 (24904052)	3
96 (24475797)	2
94 (29188304)	4
93 (25994036)	2
91 (24475838)	1

		89 (22300925)	2												
		92 (22095967)	1												
		90 (19467814)	3												
MRA head without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0
		References	Study Quality												
		95 (24029646)	1												
		97 (19833802)	2												
		88 (24904052)	3												
		96 (24475797)	2												
		94 (29188304)	4												
		93 (25994036)	2												
		91 (24475838)	1												
		89 (22300925)	2												
		92 (22095967)	1												
		90 (19467814)	3												
MRA head with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	n/a	0	0	0	0	0	0	0	0	0
		References	Study Quality												
		95 (24029646)	1												
		97 (19833802)	2												
		88 (24904052)	3												
		96 (24475797)	2												
		94 (29188304)	4												
		93 (25994036)	2												
		91 (24475838)	1												
		89 (22300925)	2												
		92 (22095967)	1												
		90 (19467814)	3												
MRI head without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0

		References		Study Quality											
		83 (22107856)		4											
		86 (22705129)		4											
MRI head without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		83 (22107856)		4											
		86 (22705129)		4											
MRI head perfusion with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		83 (22107856)		4											
		98 (22791027)		3											
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		83 (22107856)		4											
		85 (23615081)		2											
CT head without IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		83 (22107856)		4											
		85 (23615081)		2											
CT head without and with IV contrast	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality											
		83 (22107856)		4											

		85 (23615081)			2											
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
83 (22107856)	4
86 (22705129)	4

Variant 7: Suspected central nervous system (CNS) vasculitis. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRA head without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	99 (24491822)		4												
MRI head without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	99 (24491822)		4												
	101 (17924545)		4												
	109 (19221296)		4												
	107 (29030476)		4												
	108 (24722305)		4												
	105 (25907920)		4												
MRI head without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	99 (24491822)		4												
	101 (17924545)		4												
	109 (19221296)		4												
	107 (29030476)		4												
	108 (24722305)		4												
	105 (25907920)		4												
CTA head with IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	6	n/a	0	0	0	0	0	0	0	0	0
	References		Study Quality												
	99 (24491822)		4												
Arteriography cervicocerebral	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	6	n/a	0	0	0	0	0	0	0	0	0

		References		Study Quality												
		99 (24491822)		4												
		107 (29030476)		4												
CTA neck with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CT head perfusion with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	Varies	1	n/a	0	0	0	0	0	0	0	0	0
MRA head without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
		References		Study Quality												
		99 (24491822)		4												
MRA neck without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA neck without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head perfusion with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler carotid	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
US duplex Doppler transcranial	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

MRV head without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
CTV head with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRA head with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
99 (24491822)	4

MRA neck with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRV head with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
MRI head with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0

References	Study Quality
99 (24491822)	4
101 (17924545)	4
109 (19221296)	4
107 (29030476)	4
108 (24722305)	4
105 (25907920)	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.**