American College of Radiology
ACR Appropriateness Criteria®

Imaging for Pulmonary Embolism, Known Clot

Variant 1: Adult. Known history of acute pulmonary embolism. Suspected recurrent or residual embolic disease. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations 1	2	3	4	5	6	7	8	9
CTA pulmonary arteries with IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	9	0	0	0	0	0	0	1	1	10

References	Study Quality
21 (29846802)	2
19 (25445893)	2
17 (24147466)	2
14 (30962147)	2
15 (1732955)	4
16 (9280245)	3
18 (35774215)	2
20 (35738818)	4

V/Q scan lung	Usually appropriate	Moderate	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	7	7	0	0	0	1	3	2	2	4	0

References	Study Quality
37 (17475953)	4
35 (18165667)	1
34 (19465853)	4
36 (18195380)	3

MRA chest with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	4	2	6	0	0

References	Study Quality
22 (12020524)	1
25 (21347594)	4
27 (21947513)	3
24 (23553735)	3
23 (20368649)	2
26 (21887483)	3

V/Q scan with SPECT or SPECT/CT lung	Usually appropriate	Strong	☢☢☢ 1-10 mSv		7	7	0	0	0	1	2	2	2	4	1

References	Study Quality
41 (19525358)	2
38 (24852679)	2
39 (17625390)	2
43 (32198309)	2
42 (33433051)	Good
40 (37487880)	Good

MRA chest without and with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	1	0	0	0	5	1	5	0	0

References	Study Quality
22 (12020524)	1
25 (21347594)	4
27 (21947513)	3
23 (20368649)	2
28 (28116500)	2
26 (21887483)	3

MRA chest without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	0	3	0	5	5	0	0	0	0

References	Study Quality
28 (28116500)	2

US echocardiography transthoracic resting	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	4	4	1	2	3	3	2	1	0	0	0

		References		Study Quality												
		32 (26669928)		3												
		31 (8752195)		2												
		33 (34875048)		4												
CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	4	2	3	1	1	1	0	0	0
CT heart function and morphology with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	5	1	3	2	0	0	1	0	0
Arteriography pulmonary	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	1	4	3	2	1	0	1	0	0
Arteriography pulmonary with right heart catheterization	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	3	2	4	0	2	0	1	0	0
MRI heart function and morphology without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	2	2	6	1	1	0	0	0	0
MRI heart function and morphology without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	2	2	4	3	1	0	0	0	0
		References		Study Quality												
		29 (36843875)		3												
CT chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	2	5	5	1	0	0	0	0	0
US echocardiography transesophageal	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	3	4	3	1	0	1	0	0	0
		References		Study Quality												
		32 (26669928)		3												
		31 (8752195)		2												
Radiography chest	Usually not appropriate	Limited	☢ <0.1 mSv	☢ <0.03 mSv [ped]	2	2	6	4	2	0	0	0	1	0	0
		References		Study Quality												

		30 (28060193)		4											
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	7	2	2	1	0	0	0	0	0

Variant 2: Adult. Known chronic thromboembolic disease. Surveillance.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTA pulmonary arteries with IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	9	9	0	0	0	1	0	1	1	3	6

References	Study Quality
19 (25445893)	2
54 (27501891)	2
30 (28060193)	4
60 (27501896)	2
59 (34459967)	2
58 (32991219)	3
49 (33334946)	4
51 (34712746)	2
52 (30897932)	2
53 (7962789)	3
55 (35800352)	3
56 (37423613)	3
57 (33532057)	3

MRA chest with IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	0	1	2	3	2	4	0	0

References	Study Quality
64 (30311032)	2
63 (26727392)	3
62 (32096280)	3

		61 (15332240)		3												
Arteriography pulmonary with right heart catheterization	May be appropriate (Disagreement)	Expert Opinion	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	2	0	3	1	0	6	1	0
		References		Study Quality												
		47 (30545968)		4												
		48 (27327769)		3												
		49 (33334946)		4												
MRA chest without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	2	1	2	4	3	1	0	0
		References		Study Quality												
		64 (30311032)		2												
		63 (26727392)		3												
		62 (32096280)		3												
		61 (15332240)		3												
MRI heart function and morphology without IV contrast	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	5	5	1	0	0	3	3	2	2	1	0
		References		Study Quality												
		68 (30790024)		2												
		69 (30159622)		2												
		12 (36372884)		3												
		66 (14760316)		3												
		67 (35111592)		3												
		70 (10478263)		3												
		71 (35185084)		4												
MRI heart function and morphology without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	2	2	3	1	5	0	0	0
		References		Study Quality												
		68 (30790024)		2												
		69 (30159622)		2												
		12 (36372884)		3												

		66 (14760316)		3												
		67 (35111592)		3												
		70 (10478263)		3												
		71 (35185084)		4												
V/Q scan lung	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	5	5	1	1	0	0	5	2	4	0	0	
		References		Study Quality												
		75 (32531708)		2												
		74 (35194769)		3												
		76 (2245685)		2												
US echocardiography transthoracic resting	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	1	0	4	2	2	0	4	0	
		References		Study Quality												
		72 (26476768)		2												
		73 (36265185)		1												
V/Q scan with SPECT or SPECT/CT lung	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv		5	5	1	1	0	0	5	2	4	0	0	
		References		Study Quality												
		77 (33688452)		2												
		78 (34785945)		2												
Arteriography pulmonary	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	0	2	1	4	5	1	0	0	0	
		References		Study Quality												
		45 (25828726)		3												
		44 (27729418)		2												
		46 (37470202)		4												
CT chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	4	1	4	1	1	0	1	0	0	

CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	4	2	4	2	0	0	0	0	0
CT heart function and morphology with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	1	2	5	0	4	0	0	0	0

References	Study Quality
50 (22843839)	3
51 (34712746)	2

MRA chest without IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	3	3	1	2	2	1	0	0	0

References	Study Quality
65 (15844148)	3

CT chest without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	6	3	2	0	1	0	0	0	0
US echocardiography transesophageal	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	4	4	2	3	0	0	0	0	0

References	Study Quality
72 (26476768)	2
73 (36265185)	1

Radiography chest	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢ <0.03 mSv [ped]	2	2	5	2	3	0	1	0	1	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.**