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		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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
V/Q scan lung	Usually appropriate	Moderate	☢☢☢ 1-10 mSv		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

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
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

Procedure	Appropriateness	Strength	Adult RRL	Ped RRL											
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

Procedure	Appropriateness	Strength	Adult RRL	Ped RRL											
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

Procedure	Appropriateness	Strength	Adult RRL	Ped RRL											
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

Procedure	Appropriateness	Strength	Adult RRL	Ped RRL											
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

Procedure		Evidence	Adult dose	Pediatric dose										
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	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	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

Procedure		Evidence	Adult dose	Pediatric dose										
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

Procedure		Evidence	Adult dose	Pediatric dose										
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

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

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

Procedure	Appropriateness Category	Evidence	Adult RRL	Pediatric RRL											
Arteriography pulmonary with right heart catheterization	May be appropriate (Disagreement)	Expert Opinion	☢☢☢☢ 10-30 mSv		5	5	0	2	0	3	1	0	6	1	0

References	Study Quality
47 (30545968)	4
48 (27327769)	3
49 (33334946)	4

Procedure	Appropriateness Category	Evidence	Adult RRL	Pediatric RRL											
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

Procedure	Appropriateness Category	Evidence	Adult RRL	Pediatric RRL											
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

Procedure	Appropriateness Category	Evidence	Adult RRL	Pediatric RRL											
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

Procedure	Appropriateness	Evidence	Adult Dose	Pediatric Dose											
		67 (35111592)			3										
		70 (10478263)			3										
		71 (35185084)			4										
V/Q scan lung	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv		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		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.**