

American College of Radiology ACR Appropriateness Criteria®

Suspected Pulmonary Embolism

Variant 1: Suspected pulmonary embolism. Low or intermediate pretest probability with a negative D-dimer. Initial Imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT chest without IV contrast	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	2	2	8	4	2	1	1	1	0	0	1
		References		Study Quality											
		12 (20592294)		4											
		13 (21047572)		4											
		14 (20740096)		1											
		15 (19620439)		3											
		16 (18343077)		3											
		8 (21969343)		M											
CTA chest with IV contrast with CTV lower extremities	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹☹ 3-10 mSv [ped]	2	2	8	5	2	2	0	0	1	0	0
		References		Study Quality											
		12 (20592294)		4											
		13 (21047572)		4											
		14 (20740096)		1											
		15 (19620439)		3											
		16 (18343077)		3											
		8 (21969343)		M											
US duplex Doppler lower extremity	Usually not appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	2	2	9	7	1	1	0	0	0	0	0

Variant 2: Suspected pulmonary embolism. Low or intermediate pretest probability with a positive D-dimer. 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	1	0	0	0	0	1	1	1	14
		References		Study Quality											
		20 (14657313)		1											
		22 (12500376)		4											
		23 (16097441)		3											
		21 (8284406)		2											
		24 (14658001)		3											
V/Q scan lung	Usually appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕ 0.3-3 mSv [ped]	7	7	0	0	0	2	0	5	7	3	1
		References		Study Quality											
		59 (7152856)		4											
		10 (8372182)		3											
		61 (17060547)		1											
		58 (18165667)		1											
		1 (28671347)		4											
		60 (17625390)		2											
		MRA pulmonary arteries without and with IV contrast	May be appropriate	Strong	○ 0 mSv										○ 0 mSv [ped]
		References		Study Quality											
		34 (16794142)		2											
		35 (16714660)		2											
		36 (12020524)		1											
		38 (16632150)		3											
		39 (22375614)		4											

[illegible]

45 (18043357)	3
49 (19427980)	1
47 (17555069)	4
48 (17179348)	1

CT chest with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	7	8	2	1	0	0	0	0	0
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	7	7	2	1	1	0	0	0	0
CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	4	8	4	2	0	0	0	0	0
Arteriography pulmonary with right heart catheterization	Usually not appropriate	Limited	☼☼☼☼ 10-30 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	9	3	5	1	0	0	0	0	0

References	Study Quality
19 (8222808)	3
18 (6859705)	4
17 (16515356)	3
32 (15333370)	3
33 (1735144)	3

US echocardiography transthoracic resting	Usually not appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	2	2	6	4	4	1	1	1	0	1	0
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References	Study Quality
56 (8090877)	4
52 (17000366)	1
53 (12514752)	2
54 (10407975)	2
55 (8162798)	4
57 (2108571)	3
51 (26669928)	3
50 (8752195)	2

US echocardiography transesophageal	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	9	5	3	0	0	1	0	0	0
		References		Study Quality											
		56 (8090877)		4											
		52 (17000366)		1											
		53 (12514752)		2											
		54 (10407975)		2											
		55 (8162798)		4											
		57 (2108571)		3											
		51 (26669928)		3											
		50 (8752195)		2											

Variant 3: Suspected pulmonary embolism. High pretest probability. 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	1	0	0	0	0	0	0	1	16
		References		Study Quality											
		20 (14657313)		1											
		22 (12500376)		4											
		23 (16097441)		3											
		21 (8284406)		2											
		24 (14658001)		3											
V/Q scan lung	Usually appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	7	7	0	2	0	0	1	2	6	6	1
		References		Study Quality											
		59 (7152856)		4											
		10 (8372182)		3											
		61 (17060547)		1											

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53 (12514752)	2
54 (10407975)	2
55 (8162798)	4
57 (2108571)	3
51 (26669928)	3
50 (8752195)	2

CTA triple rule out	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv		3	3	2	6	3	2	3	2	0	0	0
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References		Study Quality	
29 (16738268)		2	
30 (9442137)		3	
28 (17675613)		1	
31 (26124909)		3	

CT chest with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	6	7	5	0	0	0	0	0	0
CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	7	6	4	0	0	0	0	0	1
CTA chest with IV contrast with CTV lower extremities	Usually not appropriate	Strong	⊕⊕⊕ 1-10 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	6	7	3	1	0	1	0	0	0

References		Study Quality	
25 (11323478)		1	
27 (18212216)		3	
26 (10966705)		2	

Arteriography pulmonary with right heart catheterization	Usually not appropriate	Limited	⊕⊕⊕⊕ 10-30 mSv	⊕⊕⊕⊕ 3-10 mSv [ped]	2	2	8	3	3	1	1	0	2	0	0
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References		Study Quality	
19 (8222808)		3	
18 (6859705)		4	
17 (16515356)		3	

		32 (15333370)	3												
		33 (1735144)	3												
MRA pulmonary arteries without IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	3	9	2	3	0	1	0	0	0
		References	Study Quality												
		34 (16794142)	2												
		24 (14658001)	3												
		43 (28116500)	2												
US echocardiography transesophageal	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	2	2	8	6	2	0	1	1	0	0	0
		References	Study Quality												
		56 (8090877)	4												
		52 (17000366)	1												
		53 (12514752)	2												
		54 (10407975)	2												
		55 (8162798)	4												
		57 (2108571)	3												
		51 (26669928)	3												
		50 (8752195)	2												
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	10	4	3	1	0	0	0	0	0

Variant 4: Suspected pulmonary embolism. Pregnant patient. Initial Imaging.

MRA pulmonary arteries without IV contrast	Usually not appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	2	2	4	7	4	3	0	0	0	0	0
		References		Study Quality											
		34 (16794142)		2											
		24 (14658001)		3											
		43 (28116500)		2											
US echocardiography transthoracic resting	Usually not appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	2	2	5	5	1	2	3	1	0	1	0
		References		Study Quality											
		56 (8090877)		4											
		52 (17000366)		1											
		53 (12514752)		2											
		54 (10407975)		2											
		55 (8162798)		4											
		57 (2108571)		3											
		51 (26669928)		3											
		50 (8752195)		2											
CTA triple rule out	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		2	2	7	8	3	0	0	0	0	0	0
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	11	4	1	0	1	1	0	0	0
CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	10	5	3	0	0	0	0	0	0
CTA chest with IV contrast with CTV lower extremities	Usually not appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	10	4	2	0	1	1	0	0	0
		References		Study Quality											
		25 (11323478)		1											
		27 (18212216)		3											
		26 (10966705)		2											

Arteriography pulmonary with right heart catheterization	Usually not appropriate	Limited	☹☹☹☹ 10-30 mSv	☹☹☹☹ 3-10 mSv [ped]	1	1	14	0	0	4	0	0	0	0	0	0
		References		Study Quality												
		32 (15333370)		3												
		33 (1735144)		3												
MRA pulmonary arteries without and with IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	10	2	4	0	0	1	1	0	0	0
		References		Study Quality												
		66 (-3188535)		4												
US echocardiography transesophageal	Usually not appropriate	Strong	○ 0 mSv	○ 0 mSv [ped]	1	1	11	5	1	0	0	1	0	0	0	0
		References		Study Quality												
		56 (8090877)		4												
		52 (17000366)		1												
		53 (12514752)		2												
		54 (10407975)		2												
		55 (8162798)		4												
		57 (2108571)		3												
		51 (26669928)		3												
		50 (8752195)		2												

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.