American College of Radiology
ACR Appropriateness Criteria®

Workup of Pleural Effusion or Pleural Disease

Variant 1: Recent pneumonia with suspected parapneumonic effusion or empyema. 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 with IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	8	0	0	0	0	1	0	2	5	5

References	Study Quality
17 (26076488)	2
13 (28274565)	4
16 (28370693)	2
18 (21622586)	2
14 (35049844)	4
15 (33820639)	2
19 (21159803)	1
20 (-3195839)	4

Radiography chest	Usually appropriate	Strong	☢ <0.1 mSv	☢ <0.03 mSv [ped]	8	8	0	0	0	0	0	1	3	3	6

References	Study Quality
26 (17278083)	4
29 (27613540)	3
27 (27793503)	2
28 (21651642)	2
25 (9356004)	4

US chest	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	2	0	2	2	1	4	2	0

References	Study Quality
29 (27613540)	3
33 (27709281)	3
36 (19933660)	3
13 (28274565)	4
30 (33033148)	4
31 (11127008)	2
32 (19616366)	2
34 (30675767)	2
35 (11762545)	2

CT chest without IV contrast	May be appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	1	0	3	5	3	0	1	0	0

References	Study Quality
17 (26076488)	2
16 (28370693)	2
18 (21622586)	2
14 (35049844)	4

MRI chest without and with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	3	3	5	1	1	2	3	1	0	0	0

References	Study Quality
22 (33963675)	2
23 (32191736)	2
21 (28931146)	4
24 (21364472)	4

CTA chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	6	5	2	0	0	0	0	0	0
MRI chest without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	6	1	2	2	1	0	1	0	0

CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	11	0	2	0	0	0	0	0	0

Variant 2: Recent minor blunt trauma with suspected pleural effusion. 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 with IV contrast	Usually appropriate	Moderate	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	8	8	0	1	0	0	1	0	4	4	3

References	Study Quality
38 (26169926)	3
39 (28130347)	4
40 (30287121)	2

Radiography chest	Usually appropriate	Strong	☢ <0.1 mSv	☢ <0.03 mSv [ped]	8	8	0	0	0	0	0	0	5	2	6

References	Study Quality
47 (24626118)	2
39 (28130347)	4
40 (30287121)	2
46 (15082295)	2
49 (29433802)	Good
50 (31179075)	1

CTA chest with IV contrast	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	1	2	0	1	1	0	1	7	0

References	Study Quality
43 (26440607)	1
42 (21045745)	2
44 (27299139)	Good

US chest	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	1	2	0	4	2	2	2	0

References	Study Quality
30 (33033148)	4
49 (29433802)	Good

CT chest without IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	0	2	1	6	3	0	1	0	0

References	Study Quality
41 (-3195840)	2

CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	1	2	0	0	0	0	0	0
MRI chest without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	0	1	2	1	1	0	0	0
MRI chest without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	7	1	1	2	0	2	0	0	0
Image-guided aspiration chest	Usually not appropriate	Expert Consensus	Varies	Varies	1	1	10	2	1	0	0	0	0	0	0

Variant 3: Dyspnea, cough, or chest pain with suspected pleural effusion, noninfectious. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Radiography chest	Usually appropriate	Limited	☢ <0.1 mSv	☢ <0.03 mSv [ped]	9	9	0	0	0	0	1	0	2	3	7

References	Study Quality
7 (20696692)	4
60 (25572643)	2
59 (34447992)	4

CT chest with IV contrast	Usually appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	7	0	0	0	0	2	2	3	6	0

References	Study Quality
52 (30406935)	4
53 (28025056)	2
19 (21159803)	1
50 (31179075)	1

US chest	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	2	2	1	5	1	1	1	0

References	Study Quality
32 (19616366)	2
63 (33721865)	2
64 (-3195841)	4

CT chest without IV contrast	May be appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	2	1	1	3	5	1	0	0	0

References	Study Quality
54 (25881595)	2
55 (26150676)	4

CTA chest with IV contrast	Usually not appropriate	Strong	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	3	3	1	1	5	0	0	0	0

References	Study Quality
57 (27423676)	3
58 (30044259)	2
56 (17298456)	2

CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	10	1	1	1	0	0	0	0	0
MRI chest without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	0	1	4	0	0	0	0	0

MRI chest without and with IV contrast	Usually not appropriate	Strong	O 0 mSv	O 0 mSv [ped]	1	1	7	1	1	3	1	0	0	0	0

References	Study Quality
60 (25572643)	2
57 (27423676)	3
58 (30044259)	2
59 (34447992)	4

Variant 4: Pleural effusion incidentally detected on incomplete thoracic imaging study. Next imaging study.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CT chest with IV contrast	May be appropriate (Disagreement)	Expert Opinion	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	1	1	2	1	5	1	0	2	0
US chest	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	3	3	1	0	3	2	1	0	0
Radiography chest	May be appropriate (Disagreement)	Expert Opinion	☢ <0.1 mSv	☢ <0.03 mSv [ped]	5	5	2	1	1	2	5	1	0	0	1
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	4	1	2	2	3	0	1	0	0
MRI chest without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	6	2	0	3	0	1	0	1	0
CTA chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	9	1	3	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]	1	1	10	2	1	0	0	0	0	0	0
MRI chest without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	8	0	0	3	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.**