American College of Radiology ACR Appropriateness Criteria®

Chest Pain-Child

Variant 1: Child. Chest pain. Limited to the chest wall. Initial imaging.

| P 1 | Appropri | ateness | COL | A L L. DDI | D 1 DD1 | D | 3.6.19 | | | F | inal ' | Tabu | latio | ns | | |
|------------------------------|-------------------|---------|---------------------|------------------------|----------------------------|-----------|--------|----|---|---|--------|------|-------|----|---|---|
| Procedure | Categ | gory | SOE | Adults RRL | Peds RRL | Rating | Median | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Radiography chest | Usua approp | | Limited | ⊕ <0.1 mSv | | 7 | 7 | 0 | 0 | 0 | 0 | 3 | 2 | 4 | 3 | 2 |
| | | | References | | Study | y Quality | | | | | | | | | | |
| | | | 15 (35316339) | | | 4 | | | | | | | | | | |
| | | | 14 (24209723) | | | 4 | | | | | | | | | | |
| US chest | May approp | | Limited | O 0 mSv | O 0 mSv [ped] | 6 | 6 | 1 | 0 | 0 | 0 | 4 | 3 | 5 | 0 | 1 |
| | | | References | | Study | y Quality | | · | | • | • | | • | | | |
| | | | 17 (30612161) | | Study Quality 2 | | | | | | | | | | | |
| | | | 16 (34117521) | | | | | | | | | | | | | |
| | | | 15 (35316339) | | | 4 | | | | | | | | | | |
| Radiography rib views | May approp | | Limited | ⊕⊕⊕ 1-10 mSv | | 6 | 6 | 1 | 0 | 0 | 0 | 3 | 4 | 4 | 2 | 0 |
| | | | References | | Study | y Quality | | | | | | | | | | |
| | | | 16 (34117521) | | | 4 | | | | | | | | | | |
| CT chest with IV contrast | Usually approp | | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 10 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| CT chest without IV contrast | Usually approp | | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 10 | 0 | 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] | 1 | 1 | 11 | 0 | 2 | 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 | 10 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| MRI chest without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 9 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 |

Variant 2: Child. Chest pain. Suspected pneumothorax or pneumomediastinum. Initial imaging.

| D | Appropriateness | COF | A J14. DDI | D. J. DDI | D - 45 | M. P | | | F | inal ' | Tabu | latio | ns | | |
|---------------------------------------|-------------------------|---------------------|-------------------|----------------------------|---------|--------|----|---|---|--------|------|-------|----|---|----|
| Procedure | Category | SOE | Adults RRL | Peds RRL | Rating | Median | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Radiography chest | Usually appropriate | Limited | ≎ <0.1 mSv | | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| | | References | | Study | Quality | | | | | | | | | | |
| | | 23 (38547031) | | | 4 | | | | | | | | | | |
| US chest | Usually not appropriate | Limited | O 0 mSv | O 0 mSv [ped] | 2 | 2 | 6 | 2 | 1 | 3 | 0 | 2 | 0 | 0 | 0 |
| | | References | | Study | Quality | | | | | | | | | | |
| | | 24 (24844730) | | | 4 | | | | | | | | | | |
| | | 25 (25056671) | | | 1 | | | | | | _ | | | | |
| Radiography chest decubitus view | Usually not appropriate | Expert Consensus | | | 2 | 2 | 5 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| CT chest with IV contrast | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 10 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 |
| CT chest without IV contrast | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 8 | 2 | 1 | 0 | 2 | 0 | 0 | 1 | 0 |
| CT chest without and with IV contrast | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 10 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 0 |

| Fluoroscopy upper GI series | Usually not appropriate | | ��� 1-10 mSv | ��� 0.3- 3 mSv [ped] | 1 | 1 | 11 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
|---|-------------------------|--------------------------------|-----------------|----------------------------|---------|---|----|---|---|---|---|---|---|---|---|
| | | References | | Study | Quality | | | | | | | | | | |
| | | 22 (37089060) 21 (27320840) | | | 4 | | | | | | | | | | |
| | | 21 (27320840) | | | 4 | | | | | | | | | | |
| | | 20 (25053221) | | | 4 | | | | | | | | | | |
| MRI chest without IV contrast | Usually not appropriate | | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 12 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MRI chest without and with IV contrast | Usually not appropriate | | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 12 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| US echocardiography transthoracic resting | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 12 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

Variant 3: Child. Chest pain. Suspected pulmonary embolism. Initial imaging.

| | Appropriateness | GOT | | | - · | 3.5.11 | | | F | inal ' | [abu | latio | ns | | |
|---|------------------------|---------------|------------------------|----------------------------|--------|--------|---|---|---|--------|------|-------|----|---|---|
| Procedure | Category | SOE | Adults RRL | Peds RRL | Rating | Median | 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 | 3 | 2 | 9 |
| | | References | | Study Quality 2 | | | | | | | | | | | |
| | | 33 (30204073) | | | | | | | | | | | | | |
| | | 32 (27789203) | | 1 | | | | | | | | | | | |
| | | 31 (28473073) | | 1 4 | | | | | | | | | | | |
| | | 28 (34836567) | | 4 4 | | | | | | | | | | | |
| | | 30 (28331932) | | | 4 | | | | | | | | | | |
| Radiography chest | Usually appropriate | Limited | <0.1 mSv | | 7 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 8 | 2 | 3 |
| | | References | | Study Quality | | | | | | | | | | | |
| | | 28 (34836567) | | | 4 | | | | | | | | | | |

34 (28473076) 4 V/Q scan lung **∞∞ 0.3**-**२० २०** 1-10 May be Expert 3 mSv 4 5 2 3 0 0 4 1 mSv appropriate Consensus [bed] MRA pulmonary arteries without Usually not **Expert** O 0 mSv O 0 mSv 2 2 0 6 4 3 0 0 0 0 and with IV contrast [ped] appropriate Consensus CT chest with IV contrast ₩₩₩ 3-Usually not **Expert ⊕⊕⊕** 1-10 10 mSv 10 3 0 0 0 0 0 1 1 0 appropriate Consensus mSv [bed] **∞∞∞∞** 3-CT chest without IV contrast Usually not **२० २०** 1-10 Expert 10 3 0 0 0 0 0 10 mSv 1 1 1 0 mSv appropriate Consensus [bed] **₩₩₩** 3-CT chest without and with IV Usually not **२० २०** 1-10 **Expert** 8 0 10 mSv 1 1 3 0 0 0 contrast appropriate mSv Consensus [bed] CTA chest with IV contrast with **∞∞∞∞** 3-Usually not **२० २०** 1-10 **Expert** CTV lower extremities 10 mSv 1 8 1 3 0 0 0 0 mSv Consensus appropriate [bed] Arteriography pulmonary with **����** 3-Usually not **⊕⊕⊕⊕** 10-30 Expert 10 mSv 12 0 0 0 0 0 0 right heart catheterization 1 1 1 appropriate Consensus mSv [ped] MRA pulmonary arteries without O 0 mSv Usually not O 0 mSv 8 0 3 2 0 0 0 0 Limited 1 IV contrast appropriate [ped] References Study Quality 28 (34836567) 4 US chest O 0 mSv Usually not Expert O 0 mSv 0 3 0 0 0 0 0 0 1 11 appropriate Consensus [ped] US duplex Doppler lower Usually not O 0 mSv Expert O 0 mSv 11 2 0 0 0 0 0 0 1 1 extremity appropriate Consensus [ped] US echocardiography O 0 mSv Usually not Expert O 0 mSv 0 2 0 0 0 0 1 11 0 transthoracic resting [ped] appropriate Consensus US echocardiography Usually not Expert O 0 mSv O 0 mSv 0 0 1 11 2 0 0 0 0 transesophageal [ped] appropriate Consensus

Variant 4: Child. Chest pain. Known or suspected cardiac disease. Initial imaging.

| n , | Appropriateness | COF | A L L DDI | D I DDI | D .: | 3.5 11 | | | F | inal ' | Tabu | latio | ns | | |
|---|-------------------------|---------------------|-----------------------|----------------------------|---------|--------|----|---|---|--------|------|-------|----|---|---|
| Procedure | Category | SOE | Adults RRL | Peds RRL | Rating | Median | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Radiography chest | Usually appropriate | Expert Consensus | ♦ < 0.1 mSv | | 8 | 8 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 4 | 6 |
| US echocardiography transthoracic resting | Usually appropriate | Limited | O 0 mSv | O 0 mSv [ped] | 7 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 2 | 4 |
| | | References | | Study | Quality | | | | | | | | | | |
| | | 40 (34674303) | | | 4 | | _ | | | | | | | | |
| CTA chest with IV contrast | May be appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 4 | 4 | 5 | 0 | 1 | 5 | 1 | 1 | 1 | 0 | 0 |
| CTA coronary arteries with IV contrast | May be appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 4 | 4 | 5 | 0 | 1 | 6 | 1 | 1 | 0 | 0 | 0 |
| CT heart function and morphology with IV contrast | May be appropriate | Expert Consensus | ���� 10-30 mSv | ���� 3- 10 mSv [ped] | 4 | 4 | 6 | 0 | 1 | 4 | 2 | 1 | 0 | 0 | 0 |
| US echocardiography transesophageal | Usually not appropriate | Limited | O 0 mSv | O 0 mSv [ped] | 3 | 3 | 5 | 1 | 2 | 2 | 4 | 0 | 0 | 0 | 0 |
| | | References | | Study | Quality | | | | | | | | | | |
| | | 39 (21481076) | | | 4 | | | | | | | | | | |
| US echocardiography transthoracic stress | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 2 | 2 | 7 | 1 | 4 | 1 | 0 | 0 | 0 | 1 | 0 |
| CT chest with IV contrast | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 12 | 0 | 2 | 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 | 10 | 0 | 2 | 2 | 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 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
|--|-------------------------|---------------------|-------------------|--------------------------------|---|---|----|---|---|---|---|---|---|---|---|
| Arteriography pulmonary | Usually not appropriate | Expert Consensus | ���� 10-30 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 11 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Arteriography coronary with ventriculography | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 11 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| MRA chest without IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| MRA chest without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 |
| MRI heart function and morphology without IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 9 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 |
| MRI heart function and morphology without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 8 | 1 | 2 | 0 | 2 | 0 | 1 | 0 | 0 |
| MRI heart function with stress without IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 |
| MRI heart function with stress without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 |
| V/Q scan lung | Usually not appropriate | Expert Consensus | ≎≎≎ 1-10 mSv | ��� 0.3- 3 mSv [ped] | 1 | 1 | 11 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| US chest | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 11 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| FDG-PET/CT heart | Usually not appropriate | Expert Consensus | ୫୫୫୫ 10-30 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 11 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| SPECT or SPECT/CT MPI rest and stress | Usually not appropriate | Expert Consensus | ���� 10-30 mSv | ����� 10-30 mSv [ped] | 1 | 1 | 11 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 |

Variant 5: Child. Chest pain. History of sickle cell disease. Initial imaging.

| | Appropriateness | 207 | | n 1 nn | | 35.11 | | | F | inal ' | Tabu | latio | ns | | |
|---|-------------------------|---------------------|------------------------|----------------------------|---------|--------|----|---|---|--------|------|-------|----|---|----|
| Procedure | Category | SOE | Adults RRL | Peds RRL | Rating | Median | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Radiography chest | Usually appropriate | Limited | ≎ <0.1 mSv | | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 11 |
| | | References | | Study | Quality | | | | | | | | | | |
| | | 41 (27404765) | | | 4 | | | | | | | | | | |
| CTA chest with IV contrast | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 9 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 0 |
| CT chest with IV contrast | Usually not appropriate | Expert Consensus | ��� 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 11 | 1 | 2 | 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 | 9 | 1 | 2 | 1 | 0 | 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 | 10 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 |
| MRI chest without IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 11 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| MRI chest without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 11 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| US abdomen | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| US chest | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 |
| US echocardiography transthoracic resting | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 10 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 |

| US echocardiography transthoracic stress | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 11 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
|--|-------------------------|---------------------|---------|------------------|---|---|----|---|---|---|---|---|---|---|---|
|--|-------------------------|---------------------|---------|------------------|---|---|----|---|---|---|---|---|---|---|---|

Variant 6: Child. Chest pain. Suspected panic attack. Initial imaging.

| Durandana | Appropriateness | COF | A J14. DDI | D. J. DDI | D - 45 | N/ - 1' | | | F | inal ' | Гаbu | latio | ns | | |
|---|-------------------------|---------------------|------------------------|----------------------------|--------|---------|----|---|---|--------|------|-------|----|---|---|
| Procedure | Category | SOE | Adults RRL | Peds RRL | Rating | Median | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Radiography chest | May be appropriate | Expert Consensus | ⊕ <0.1 mSv | | 6 | 6 | 0 | 0 | 0 | 2 | 2 | 5 | 3 | 0 | 2 |
| CT chest with IV contrast | Usually not appropriate | Expert Consensus | ≎≎≎ 1-10 mSv | ���� 3- 10 mSv [ped] | 1 | 1 | 11 | 0 | 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 | 12 | 1 | 1 | 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 | 12 | 0 | 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 | 13 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MRI chest without and with IV contrast | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 12 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| US chest | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 11 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| US echocardiography transthoracic resting | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 12 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| US echocardiography transthoracic stress | Usually not appropriate | Expert Consensus | O 0 mSv | O 0 mSv [ped] | 1 | 1 | 12 | 0 | 2 | 0 | 0 | 0 | 0 | 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.