American College of Radiology
ACR Appropriateness Criteria®

Suspected and Known Heart Failure

Variant 1: Adult. Suspected heart failure. No history of heart failure. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US echocardiography transthoracic resting	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	0	1	3	10

References	Study Quality
26 (11263606)	3
22 (26910112)	Good
31 (24863953)	4
27 (26559428)	4
32 (22874137)	2
33 (26811160)	Inadequate
34 (28741909)	1
28 (27037982)	4
29 (34284098)	3
1 (35363499)	4
30 (18992671)	4

Radiography chest	Usually appropriate	Strong	☢ <0.1 mSv	☢ <0.03 mSv [ped]	9	9	0	0	1	1	0	1	2	2	7

References	Study Quality
21 (20045607)	3
23 (22994440)	2
25 (22104551)	3

		22 (26910112)		Good												
		24 (30874784)		Not Assessed												
MRI heart function and morphology without IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	1	4	4	4	0	0	0
		References		Study Quality												
		20 (28785465)		4												
MRI heart function and morphology without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	1	0	1	3	3	5	0	0	0
		References		Study Quality												
		20 (28785465)		4												
CT heart function and morphology with IV contrast	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	0	1	1	7	4	0	0	0	0
		References		Study Quality												
		19 (31400060)		4												
Nuclear medicine ventriculography	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	4	4	1	0	3	7	2	0	0	0	0
US echocardiography transthoracic stress	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	4	4	3	1	2	3	3	1	0	0	0
CT chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	3	3	3	3	1	0	1	0	0
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	4	3	3	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]	3	3	4	3	3	2	1	0	1	0	0
MRI heart function with stress without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	3	3	4	2	3	3	0	1	0	0	0
		References		Study Quality												
		20 (28785465)		4												

US echocardiography transesophageal	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	6	0	5	2	0	0	0	0	0
CTA coronary arteries with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	5	4	1	0	3	0	0	0	0
CT coronary calcium	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv		2	2	7	1	3	1	1	0	1	0	0
MRA coronary arteries without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	7	2	3	0	1	0	1	0	0
FDG-PET/CT heart	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	7	1	1	1	3	0	0	0	1
Arteriography coronary	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv		1	1	8	4	1	0	0	0	0	0	0
Rb-82 PET/CT MPI rest and stress	Usually not appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv		1	1	7	5	0	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	8	3	1	1	0	0	0	0	0

Variant 2: Adult. Known heart failure. Unknown etiology. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
MRI heart function and morphology without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	8	8	0	0	0	0	1	0	2	7	4

References	Study Quality
48 (19755468)	2
47 (26251006)	2
49 (21900085)	2
50 (21789747)	1

References	Study Quality
46 (30152581)	3
51 (34936084)	3
45 (33673946)	4
53 (31910649)	2
52 (29321034)	3

US echocardiography transthoracic resting	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	8	8	0	0	1	0	2	1	3	3	4	

References	Study Quality
64 (32558395)	2

CTA coronary arteries with IV contrast	Usually appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	7	7	1	0	0	1	0	1	5	5	1	

References	Study Quality
39 (23759285)	2
38 (25281557)	3
19 (31400060)	4

MRI heart function and morphology without IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	5	2	5	0	

References	Study Quality
45 (33673946)	4

MRI heart function with stress without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	1	2	6	3	1	

References	Study Quality
54 (33472397)	2

US echocardiography transthoracic stress	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	0	1	11	1	0	

References	Study Quality
67 (21685198)	4
66 (22291430)	2
68 (30451399)	3
65 (28327159)	4

SPECT or SPECT/CT MPI rest and stress	Usually appropriate	Strong	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	7	7	0	0	0	0	3	3	5	3	0

References	Study Quality
56 (23990345)	4
62 (24948152)	4
63 (27331209)	3
60 (30815834)	3
61 (34344513)	2
57 (9832104)	2
58 (15219501)	3
59 (19152132)	2

CT heart function and morphology with IV contrast	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	1	0	0	5	4	0	4	0	0

References	Study Quality
19 (31400060)	4
40 (32548777)	4
41 (25727003)	4

Arteriography coronary	May be appropriate	Limited	☢☢☢ 1-10 mSv		5	5	0	0	0	1	6	4	1	1	0

References	Study Quality
35 (22499335)	4
1 (35363499)	4

US echocardiography transesophageal	May be appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	4	6	2	0	1	0
FDG-PET/CT heart	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	0	0	4	5	4	0	0	0

References	Study Quality
44 (32670472)	4
42 (35579526)	Good

		43 (33688455)		4												
Rb-82 PET/CT MPI rest and stress	May be appropriate	Limited	☢☢☢☢ 10-30 mSv		5	5	0	0	0	6	5	2	0	0	0
		References		Study Quality												
		55 (30902043)		3												
CT coronary calcium	Usually not appropriate	Strong	☢☢☢ 1-10 mSv		3	3	3	1	5	3	1	0	0	0	0
		References		Study Quality												
		39 (23759285)		2												
		36 (21257010)		2												
		37 (28041705)		4												
		38 (25281557)		3												
CT chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	5	2	5	1	1	0	0	0	0
MRA coronary arteries without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	5	1	7	0	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	2	4	1	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	5	4	3	1	1	0	0	0	0
Nuclear medicine ventriculography	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	5	2	6	0	0	0	0	0	0
Radiography chest	Usually not appropriate	Expert Consensus	☢ <0.1 mSv	☢ <0.03 mSv [ped]	2	2	4	3	6	0	0	0	0	0	0

Variant 3: Adult. Known heart failure. Follow-up imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US echocardiography transthoracic resting	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	1	3	3	7

References	Study Quality
82 (15808765)	3
83 (25783858)	3
87 (21029826)	1
81 (25355298)	4
27 (26559428)	4
89 (21788358)	2
84 (33533883)	3
85 (32563496)	3
88 (31074794)	2
86 (32004243)	3

MRI heart function and morphology without IV contrast	Usually appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	2	1	7	3	0
MRI heart function and morphology without and with IV contrast	Usually appropriate	Moderate	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	1	1	5	3	3

References	Study Quality
73 (28017348)	Good
74 (21911738)	2
72 (33221422)	Good
75 (32312112)	3

MRI heart function with stress without and with IV contrast	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	3	2	5	1	2

References	Study Quality
78 (18634983)	3
76 (32771575)	3
77 (34419409)	2

US echocardiography transthoracic stress	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	2	5	4	1	2

References	Study Quality
93 (26082167)	2
90 (16098295)	2
91 (19609896)	2
92 (17336751)	2
94 (30777323)	2
80 (31376903)	4

CT heart function and morphology with IV contrast	May be appropriate	Expert Consensus	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	0	0	4	9	0	0	0	0
Nuclear medicine ventriculography	May be appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	0	1	2	5	5	0	0	0
Radiography chest	May be appropriate	Limited	☢ <0.1 mSv	☢ <0.03 mSv [ped]	5	5	0	1	0	4	7	0	1	0	0

References	Study Quality
79 (6507238)	3

FDG-PET/CT heart	May be appropriate	Moderate	☢☢☢☢ 10-30 mSv	☢☢☢☢ 3-10 mSv [ped]	5	5	0	0	0	4	7	1	1	0	0

References	Study Quality
69 (32771569)	3
70 (31233411)	4
71 (27609816)	2

Rb-82 PET/CT MPI rest and stress	May be appropriate	Limited	☢☢☢☢ 10-30 mSv		5	5	0	1	0	3	4	1	4	0	1

References	Study Quality
80 (31376903)	4

SPECT or SPECT/CT MPI rest and stress	May be appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	5	5	1	0	0	5	6	1	0	0	0
		References		Study Quality											
		80 (31376903)		4											
CTA coronary arteries with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	3	3	5	1	6	0	0	1	0	0	0
US echocardiography transesophageal	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	2	4	2	4	1	0	0	0	0
CT chest with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	6	5	2	0	0	0	1	0	0
CT chest without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	6	5	2	0	0	1	0	0	0
CT chest without and with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	2	2	6	5	2	0	0	0	1	0	0
MRA coronary arteries without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	5	4	3	0	0	1	1	0	0
CT coronary calcium	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv		1	1	8	3	1	0	0	1	1	0	0
Arteriography coronary	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv		1	1	10	0	2	0	1	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.**