

AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guideline CT HEART CT HEART Congenital (Not including coronary arteries)	Original Date: September 1997
CPT Codes: 75572, 75573	Last Revised Date: March-February 2022¹
Guideline Number: NIA_CG_025	Implementation Date: January 2023²

GENERAL INFORMATION

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.

INDICATIONS FOR HEART COMPUTED TOMOGRAPHY (CT)^{1, 2}

~~(Douglas, 2011; Taylor, 2010)~~

Congenital Heart Disease³

~~(Sachdeva, 2020)~~

For all indications below, either CT or CMR can be performed:

- All congenital lesions: prior to planned repair and for change in clinical status and/or new concerning signs or symptoms
- Patent Ductus Arteriosus: routine surveillance (1-2 years) in a patient with postprocedural aortic obstruction
- Aortic Stenosis or Regurgitation: routine surveillance (6-12 months) in a child with aortic sinus and/or ascending aortic dilation with increasing size
- Aortic Coarctation and Interrupted Aortic Arch:
 - Routine surveillance (3–5 years) in a child or adult with mild aortic coarctation
 - Post procedure (surgical or catheter-based) routine surveillance (3–5 years) in an asymptomatic patient to evaluate for aortic arch aneurysms, in-stent stenosis, stent fracture, or endoleak
- Tetralogy of Fallot:

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1— Heart CT

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- Routine surveillance (2–3 years) in a patient with valvular or ventricular dysfunction, right ventricular outflow tract obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of an RV-to-PA conduit
- D-Loop Transposition of the Great Arteries (postoperative):
 - Routine surveillance (3–5 years) in an asymptomatic patient
 - Routine surveillance (1–2 years) in a patient with dilated aortic root with increasing size, or aortic regurgitation
 - Routine surveillance (3–12 months) in a patient with ≥moderate systemic AV valve regurgitation, systemic RV dysfunction, LVOT obstruction, or arrhythmias
- Congenitally Corrected Transposition of the Great Arteries:
 - Unrepaired: routine surveillance (3–5 years) in an asymptomatic patient
 - Postoperative: routine surveillance (3–5 years) in an asymptomatic patient
 - Postoperative anatomic repair: routine surveillance (6–12 months) in a patient with valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, or presence of an RV-to-PA conduit
 - Postoperative physiological repair with VSD closure and/or LV-to-PA conduit: routine surveillance (3–12 months) in a patient with ≥moderate systemic AV valve regurgitation, systemic RV dysfunction, and/or LV-to-PA conduit dysfunction
- Truncus Arteriosus: routine surveillance (1–2 years) in an asymptomatic child or adult with ≥ moderate truncal stenosis and/or regurgitation
- Single-Ventricle Heart Disease (includes hypoplastic left heart syndrome, double-inlet LV, double-inlet RV, mitral atresia, tricuspid atresia, unbalanced A-V septal defect):
postoperative routine surveillance (13–25 years) in an asymptomatic patient:
~~postoperative routine surveillance (3–5 years) in an asymptomatic patient~~
- ~~Hypoplastic Left Heart Syndrome: prior to planned palliative procedures and for post-operative routine surveillance (2–3 years) following Fontan procedure).~~
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Cardiomyopathy

- Quantification of myocardial (muscle) mass (CMR or CT)
- Assessment of right ventricular morphology in suspected arrhythmogenic right ventricular cardiomyopathy, based upon other findings such as:
 - Nonsustained VT
 - Unexplained syncope
 - ECG abnormalities
 - First-degree relative with positive genotype of ARVC (either, but CMR is superior to CT)^{4, 5} ~~(Marcus, 2010; te Riele, 2015)~~

Valvular Heart Disease

- Characterization of native or prosthetic valves with clinical signs or symptoms suggesting valve dysfunction, when TTE, TEE, and/or fluoroscopy have been inadequate⁶ ~~(Doherty, 2017)~~

- Evaluation of RV function in severe TR, including systolic and diastolic volumes, when TTE images are inadequate and CMR is not readily available
- Pulmonary hypertension in the absence of severe valvular disease
- Evaluation of suspected infective endocarditis with moderate to high pretest probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when TTE and TEE have been inadequate
- Evaluation of suspected paravalvular infections when the anatomy cannot be clearly delineated by TTE and TEE⁷ ~~(Nishimura, 2014)~~

Evaluation of Intra- and Extra-cardiac Structures

- Evaluation of cardiac mass, suspected tumor or thrombus, or cardiac source of emboli, when imaging with TTE and TEE have been inadequate
- Re-evaluation of prior findings for interval change (i.e., reduction or resolution of atrial thrombus after anticoagulation), when a change in therapy is anticipated⁶⁻⁸ ~~(Baumgartner, 2017; Doherty, 2017; Nishimura, 2014)~~
- Evaluation of pericardial anatomy, when TTE and/or TEE are inadequate or for better tissue characterization of a mass and detection of metastasis [CMR superior for physiologic assessment (constrictive versus restrictive) and tissue characterization, CT superior for calcium assessment]^{9, 10} ~~(Klein, 2013; Pennell, 2010)~~

Electrophysiologic Procedure Planning²

~~(Taylor, 2010)~~

- Evaluation of pulmonary venous anatomy prior to radiofrequency ablation of atrial fibrillation and for follow-up when needed for evaluation of pulmonary vein stenosis
- Non-invasive coronary vein mapping prior to placement of biventricular pacing leads

Transcatheter Structural Intervention Planning

- Evaluation for transcatheter aortic valve replacement (TAVR)^{6, 11, 12} ~~(Doherty, 2017; Otto, 2017; Schoenhagen, 2010)~~
- When TTE and TEE cannot provide adequate imaging, CT imaging can be used for planning: robotic mitral valve repair, atrial septal defect closure, left atrial appendage closure, ventricular septal defect closure, endovascular grafts, and percutaneous pulmonic valve implantation^{12, 13} ~~(Pison, 2015; Schoenhagen, 2010)~~
- Evaluation for suitability of transcatheter mitral valve procedures, alone or in addition to TEE¹⁴ ~~(Wunderlich, 2018)~~

Aortic Pathology^{6-8, 15-20}

~~(Baumgartner, 2014; Bhawe, 2018; Doherty, 2017, 2019; Erbel, 2014; Hendel, 2006; Hiratzka, 2010; Nishimura, 2014; Svensson, 2013)~~

- CT, MR, or echo can be used for screening and follow-up, with CT and MR preferred for imaging beyond the proximal ascending thoracic aorta in the following scenarios:
 - Evaluation of dilated aortic sinuses or ascending aorta identified by TTE
 - Suspected acute aortic pathology, such as dissection

- Re-evaluation of known aortic dilation or aortic dissection with a change in clinical status or cardiac examination or when findings would alter management
- Screening first-degree relatives of individuals with a history of thoracic aortic aneurysm or dissection, or an associated high-risk mutation for thoracic aneurysm in common
- Screening second-degree relative of a patient with thoracic aortic aneurysm, when the first-degree relative has aortic dilation, aneurysm, or dissection
- Six-month follow-up after initial finding of a dilated thoracic aorta, for assessment of rate of change
- Annual follow-up of enlarged thoracic aorta with size up to 4.4 cm
- Biannual (twice/yr) follow-up of enlarged aortic root ≥ 4.5 cm or showing growth rate ≥ 0.5 cm/year
- Patients with Marfan's syndrome may undergo annual imaging with CT, MRI or TTE, with increase to biannual (twice-yearly) when diameter ≥ 4.5 cm or when expansions is > 0.5 cm/yr
- Patient with Turner's syndrome ~~patients~~ should undergo initial imaging with CT, MRI, or TTE for evidence of dilatation of the ascending thoracic aorta. If imaging is normal and there are no risk factors for aortic dissection, repeat imaging should be performed every 5 - 10 years, or if otherwise indicated. If the aorta is enlarged, appropriate follow-up imaging should be done according to size, as above
- Evaluation of the aorta in the setting of a known or suspected connective tissue disease or genetic condition that predisposes to aortic aneurysm or dissection (i.e., Loeys-Dietz, Ehlers-Danlos), with re-evaluation at 6 months for rate of expansion. Complete evaluation with CMR from the cerebrovascular circulation to the pelvis is recommended with Loeys-Dietz syndrome.

BACKGROUND

- Cardiac computed tomography (Heart CT) images the cardiac chambers, great vessels, valves, myocardium, and pericardium to assess cardiac structure and function, particularly when echocardiography (transthoracic echocardiography and transesophageal echocardiography) cannot provide adequate information
- CT imaging can be used for assessment of:
 - Structures of the heart (e.g., chambers, valves, great vessels, masses, ~~etc.~~), as in this guideline
 - Quantitative level of calcium in the walls of the coronary arteries, in the separate coronary artery calcium (CAC) scoring guideline

OVERVIEW²

~~(Taylor, 2010)~~

Imaging in Congenital Heart Disease

Echocardiography is often utilized for initial assessment of congenital heart disease. However, if findings are unclear or need confirmation, CMR or CT can be useful ~~(Sachdeva, 2020)~~.³

CT and Cardiac Masses

CT and CMR are used to evaluate cardiac masses, describing their size, density, tissue characteristics, and spatial relationship to adjacent structures.

CT and Pericardial Disease

While echocardiography is most often used in the initial examination of pericardial disease, CT and CMR can evaluate pericardial thickening and masses which are often detected initially with echocardiography. CT and CMR can accurately define the site and extent of masses, e.g., cysts, hematomas, and neoplasms ~~(Klein, 2013)~~.⁹

Abbreviations

ARVD/C	Arrhythmogenic right ventricular dysplasia/-cardiomyopathy
CABG	Coronary artery bypass grafting surgery
CAD	Coronary artery disease
CCS	Coronary calcium score
CCT	Cardiac (heart) CT
CHD	Coronary heart disease
CMR	Cardiac magnetic resonance (imaging)
CT	Computed tomography
CTA	Computed tomography angiography
ECG	Electrocardiogram
EF	Ejection fraction
HF	Heart failure
<u>LVOT</u>	<u>Left ventricular outflow tract</u>
MI	Myocardial infarction
MPI	Myocardial perfusion Imaging or cardiac nuclear imaging
MR(I)	Magnetic resonance (imaging)
<u>PA</u>	<u>Pulmonary artery</u>
PCI	Percutaneous coronary intervention
PVML	Paravalvular mitral leak
RV	Right ventricle
SE	Stress e Echocardiogram
TAVR	Transcatheter a Aortic v Valve r Replacement
TMVR	Transcatheter mitral valve replacement
TR	Tricuspid regurgitation
<u>TEE</u>	<u>Transesophageal echocardiography</u>
TTE	Transthoracic echocardiography
<u>VT</u>	<u>Ventricular tachycardia</u>

POLICY HISTORY

Date	Summary
<u>February 20223</u>	<u>Listed clinical spectrum comprising single-ventricle heart disease to include: hypoplastic left heart syndrome, double-inlet LV, double-inlet RV, mitral atresia, tricuspid atresia, unbalanced A-V septal defect</u> Added indications to single-ventricle heart disease: hypoplastic left heart syndrome, double inlet LV, double inlet RV, mitral atresia, tricuspid atresia, unbalanced A-V septal defect <u>hypoplastic left heart syndrome</u>
March 2021	No changes
March 2020	<ul style="list-style-type: none"> Added general information section as Introduction which outlines requirements for documentation of pertinent office notes by a licensed clinician, and inclusion of laboratory testing and relevant imaging results for case review Extensive update to the indications for Congenital Heart Disease to include the following: <ul style="list-style-type: none"> For all indications noted, either CT or CMR can be done All lesions: evaluation prior to planned repair and evaluation for change in clinical status and/or new concerning signs or symptoms Specific indications based on lesion were added with interval and criteria for repeat imaging included Added separate section for infective endocarditis Removed tables of aortic diameter norms and suggested follow-up imaging Edits to background with removal of table outlining radiation exposure and comment Edits to overview included, with removal of the following: <ul style="list-style-type: none"> CT and CMR provide 3D anatomic relationship of the blood vessels and cardiac anatomic structures Discussion of cardiac myxoma Updated and added new references
July 2019	<ul style="list-style-type: none"> Added the following indication: Evaluation of anomalous thoracic arteriovenous vessels, such as transposition of the great arteries, when magnetic resonance imaging (MRI) cannot be performed For valvular heart disease added indication for pulmonary hypertension in the absence of severe valvular disease Removed indication: to assess degree of calcification in calcific aortic stenosis For evaluation of intra- and extra-cardiac structures, the following indication was added: Re-evaluation of prior findings for interval

	<p>change (i.e. reduction or resolution of atrial thrombus after anticoagulation), when a change in therapy is anticipated</p> <ul style="list-style-type: none"> • Removed section: scenarios in which heart CT is not indicated • Removed statement: CT imaging is competitive with MRI, but left in table in comparing two modalities (removed cost comparison)
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REFERENCES

Baumgartner H, Falk V, Bax JJ et al. 2017 ESC/EACTS guidelines for the management of valvular heart disease, The Task Force for the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). *Eur Heart J*. 2017; 38:2739–2791.

Bhave NM, Nienaber CA, Clough RE, et al. Multimodality imaging of thoracic aortic diseases in adults. *J Am Coll Cardiol Cardiovasc Imaging*. 2018; 11(6):903–919.

Cohen MS, Eidem BW, Cetta F, et al. Multimodality imaging guidelines of patients with transposition of the great arteries: A report from the American Society of Echocardiography Developed in Collaboration with the Society for Cardiovascular Magnetic Resonance and the Society of Cardiovascular Computed Tomography. *J Am Soc Echocardiogr*. 2016; 29(7):571–621.

Doherty JU, Kort S, Mehran R, et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate use criteria for multimodality imaging in valvular heart disease: A report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2017; 70(13): 1647–1672.

Doherty JU, Kort S, Mehran R, et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease. *J Am Coll Cardiol*. 2019 Feb; 73(4):488–516.

Douglas PS, Garcia MJ, Haines DE, et al. ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 Appropriate use criteria for echocardiography: A report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Society of Echocardiography, American Heart Association, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Critical Care Medicine, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance. *J Am Coll Cardiol*. 2011; 57(9):1126–66.

Erbel R. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases. *Eur Heart J*. 2014; 35(41):2873–2926. Available at: <https://academic.oup.com/eurheartj/article/35/41/2873/407693>

Fihn SD, Gardin JM, Abrams J, et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS Guideline for the diagnosis and management of patients with stable ischemic heart disease: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice

Guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. 2012; 126(25):e354-471.

Hendel RC, Patel MR, Kramer CM, et al. ACCF/ACR/SCCT/SCMR/ASNC/NASCI/SCAI/SIR 2006 Appropriateness criteria for cardiac computed tomography and cardiac magnetic resonance imaging. A TABLE OF CONTENTS 2021 Magellan Clinical Guidelines Advanced Imaging 480 report of the American College of Cardiology Foundation Quality Strategic Directions Committee Appropriateness Criteria Working Group, American College of Radiology, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, American Society of Nuclear Cardiology, North American Society for Cardiac Imaging, Society for Cardiovascular Angiography and Interventions, and Society of Interventional Radiology. *J Am Coll Cardiol*. 2006; 48(7):1475-1497. Available at: <https://www.asnc.org/files/AUC%20for%20CCT%20and%20CMRI.pdf>.

Hiratzka LF, Bakris GL, Beckman JA, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. *Circulation*. 2010; 121(13):e266.

Hiratzka LF, Creager MA, Isselbacher EM, et al. Surgery for aortic dilatation in patients with bicuspid aortic valves: A statement of clarification from the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2016; 67(6):724-731.

Hirshfeld JW, Ferrari VA, Bengel FM, et al. 2018 ACC/HRS/NASCI/SCAI/SCCT Expert consensus document on optimal use of ionizing radiation in cardiovascular imaging: Best practices for safety and effectiveness: A report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways Developed in Collaboration with Mended Hearts. *J Am Coll Cardiol*. 2018; 92(2):203-221.

Klein AL, Abbata S, Agler DA, et al. American Society of Echocardiography clinical recommendations for multimodality cardiovascular imaging of patients with pericardial disease: endorsed by the Society for Cardiovascular Magnetic Resonance and Society of Cardiovascular Computed Tomography. *J Am Soc Echocardiogr*. 2013; 26:965-1012.

Marcus FI, Sherrill D, et al. Diagnosis of arrhythmogenic right ventricular cardiomyopathy/dysplasia: proposed modification of the task force criteria. *Circulation*. 2010; 121(13):1533-1541.

~~Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC Guideline for the management of patients with valvular heart disease: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014; 63(22):e57–e185.~~

~~Otto CM, Kumbhani DJ, Alexander KP, et al. ACC Expert consensus decision pathway for transcatheter aortic valve replacement in the management of adults with aortic stenosis: A report of the American College of Cardiology Task Force on Clinical Expert Consensus Document. *J Am Coll Cardiol*. 2017;69(10):1313–1346.~~

~~Patel MR, White RD, Abbara S, et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR Appropriate utilization of cardiovascular imaging in heart failure: A joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. 2013; 61(21): 2207–2231.~~

~~Pennell DJ. Contemporary reviews in cardiovascular medicine, cardiovascular magnetic resonance. *Circulation*. 2010; 121:692–705.~~

~~Pison L, Potpara TS, Chen J, et al. Left atrial appendage closure—indications, techniques, and outcomes: Results of the European Heart Rhythm Association Survey. *Europace*. 2015; 17:642–646.~~

~~Sachdeva R, Valente AM, Armstrong AK, et al. ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients with Congenital Heart Disease. *J Am Coll Cardiol*. 2020 Jan 06. Epub. DOI:10.1016/j.jacc.2019.10.002.~~

~~Schoenhagen P, Numburi U, Halliburton SS, et al. Three-dimensional imaging in the context of minimally invasive and transcatheter cardiovascular interventions using multi-detector computed tomography: From pre-operative planning to intra-operative guidance. *Eur Heart J*. 2010; 31:2727–2741.~~

~~Svensson LG. Aortic valve and ascending aorta guidelines for management and quality measures. *Ann Thorac Surg*. 2013; 95:1–66. Available at: <http://www.sts.org/sites/default/files/documents/AorticValveandAscendingAortaGuidelinesforManagementandQualityMeasures.pdf>.~~

~~Taylor AJ, Cerqueira MC, Hodgson JM, et al. ACCF/SCCT/ACR/AHA/ASE/ASNC/NASCI/SCAI/SCMR 2010 Appropriate use criteria for cardiac computed tomography: A report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the Society of Cardiovascular Computed Tomography, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the American Society of Nuclear Cardiology, the North American Society for Cardiovascular Imaging, the Society for Cardiovascular Angiography and Interventions, and the Society for Cardiovascular Magnetic~~

~~Resonance. *J Am Coll Cardiol*. 2010; 56(22):1864-1894.~~

~~te Riele ASJM, Tandri H, Saborn DM, et al. Non-invasive multimodality imaging in ARVD/C. *J Am Coll Cardiol*. 2015; 8(5):597-611.~~

~~Wunderlich NC, Beigel R, Ho SY, et al. Imaging for mitral interventions, methods and efficacy. *J Am Coll Cardiol Cardiovascular Imaging*. 2018; 11(6):872-901.~~

Reviewed / Approved by NIA Clinical Guideline Committee

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1. Douglas PS, Garcia MJ, Haines DE, et al.

ACCF/AHA/ASA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 Appropriate Use Criteria for Echocardiography. A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Society of Echocardiography, American Heart Association, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Critical Care Medicine, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance Endorsed by the American College of Chest Physicians. *J Am Coll Cardiol*. Mar 1 2011;57(9):1126-66. doi:10.1016/j.jacc.2010.11.002

2. Taylor AJ, Cerqueira M, Hodgson JM, et al.

ACCF/SCCT/ACR/AHA/ASE/ASNC/NASCI/SCAI/SCMR 2010 appropriate use criteria for cardiac computed tomography. A report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the Society of Cardiovascular Computed Tomography, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the American Society of Nuclear Cardiology, the North American Society for Cardiovascular Imaging, the Society for Cardiovascular Angiography and Interventions, and the Society for Cardiovascular Magnetic Resonance. *J Am Coll Cardiol*. Nov 23 2010;56(22):1864-94. doi:10.1016/j.jacc.2010.07.005

3. Sachdeva R, Valente AM, Armstrong AK, et al.

ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease: A Report of the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, International Society for Adult Congenital Heart Disease, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of

Pediatric Echocardiography. *J Am Coll Cardiol*. Feb 18 2020;75(6):657-703.

doi:10.1016/j.jacc.2019.10.002

4. Marcus FI, McKenna WJ, Sherrill D, et al. Diagnosis of arrhythmogenic right ventricular cardiomyopathy/dysplasia: proposed modification of the task force criteria. *Circulation*. Apr 6 2010;121(13):1533-41. doi:10.1161/circulationaha.108.840827

5. Te Riele A, Tandri H, Sanborn DM, Bluemke DA. Noninvasive Multimodality Imaging in ARVD/C. *JACC Cardiovasc Imaging*. May 2015;8(5):597-611. doi:10.1016/j.jcmg.2015.02.007

6. Doherty JU, Kort S, Mehran R, Schoenhagen P, Soman P.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Sep 26 2017;70(13):1647-1672. doi:10.1016/j.jacc.2017.07.732

7. Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. Jun 10 2014;63(22):e57-185. doi:10.1016/j.jacc.2014.02.536

8. Baumgartner H, Falk V, Bax JJ, et al. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. *Eur Heart J*. Sep 21 2017;38(36):2739-2791. doi:10.1093/eurheartj/ehx391

9. Klein AL, Abbara S, Agler DA, et al. American Society of Echocardiography clinical recommendations for multimodality cardiovascular imaging of patients with pericardial disease: endorsed by the Society for Cardiovascular Magnetic Resonance and Society of Cardiovascular Computed Tomography. *J Am Soc Echocardiogr*. Sep 2013;26(9):965-1012.e15. doi:10.1016/j.echo.2013.06.023

10. Pennell DJ. Cardiovascular magnetic resonance. *Circulation*. Feb 9 2010;121(5):692-705. doi:10.1161/circulationaha.108.811547

11. Otto CM, Kumbhani DJ, Alexander KP, et al. 2017 ACC Expert Consensus Decision Pathway for Transcatheter Aortic Valve Replacement in the Management of Adults With Aortic Stenosis: A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Documents. *J Am Coll Cardiol*. Mar 14 2017;69(10):1313-1346. doi:10.1016/j.jacc.2016.12.006

12. Schoenhagen P, Numburi U, Halliburton SS, et al. Three-dimensional imaging in the context of minimally invasive and transcatheter cardiovascular interventions using multi-detector computed tomography: from pre-operative planning to intra-operative guidance. *Eur Heart J*. Nov 2010;31(22):2727-40. doi:10.1093/eurheartj/ehq302

13. Pison L, Potpara TS, Chen J, Larsen TB, Bongiorni MG, Blomström-Lundqvist C. Left atrial appendage closure-indications, techniques, and outcomes: results of the European Heart Rhythm Association Survey. *Europace*. Apr 2015;17(4):642-6. doi:10.1093/europace/euv069

14. Wunderlich NC, Beigel R, Ho SY, et al. Imaging for Mitral Interventions: Methods and Efficacy. *JACC Cardiovasc Imaging*. Jun 2018;11(6):872-901. doi:10.1016/j.jcmg.2018.02.024

15. Doherty JU, Kort S, Mehran R, et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. *J Am Coll Cardiol*. Feb 5 2019;73(4):488-516. doi:10.1016/j.jacc.2018.10.038
16. Bhawe NM, Nienaber CA, Clough RE, Eagle KA. Multimodality Imaging of Thoracic Aortic Diseases in Adults. *JACC Cardiovasc Imaging*. Jun 2018;11(6):902-919. doi:10.1016/j.jcmg.2018.03.009
17. Erbel R, Aboyans V, Boileau C, et al. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. Nov 1 2014;35(41):2873-926. doi:10.1093/eurheartj/ehu281
18. Hendel RC, Patel MR, Kramer CM, et al. ACCF/ACR/SCCT/SCMR/ASNC/NASCI/SCAI/SIR 2006 appropriateness criteria for cardiac computed tomography and cardiac magnetic resonance imaging: a report of the American College of Cardiology Foundation Quality Strategic Directions Committee Appropriateness Criteria Working Group, American College of Radiology, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, American Society of Nuclear Cardiology, North American Society for Cardiac Imaging, Society for Cardiovascular Angiography and Interventions, and Society of Interventional Radiology. *J Am Coll Cardiol*. Oct 3 2006;48(7):1475-97. doi:10.1016/j.jacc.2006.07.003
19. Hiratzka LF, Bakris GL, Beckman JA, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. *Circulation*. Apr 6 2010;121(13):e266-369. doi:10.1161/CIR.0b013e3181d4739e
20. Svensson LG, Adams DH, Bonow RO, et al. Aortic valve and ascending aorta guidelines for management and quality measures. *Ann Thorac Surg*. Jun 2013;95(6 Suppl):S1-66. doi:10.1016/j.athoracsur.2013.01.083

1. Cohen MS, Eidem BW, Cetta F, et al. Multimodality Imaging Guidelines of Patients with Transposition of the Great Arteries: A Report from the American Society of Echocardiography Developed in Collaboration with the Society for Cardiovascular Magnetic Resonance and the Society of Cardiovascular Computed Tomography. *J Am Soc Echocardiogr*. Jul 2016;29(7):571-621. doi:10.1016/j.echo.2016.04.002

2. Fihn SD, Gardin JM, Abrams J, et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines, and the American College of Physicians, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *Circulation*. Dec 18 2012;126(25):e354-471. doi:10.1161/CIR.0b013e318277d6a0
3. Hiratzka LF, Creager MA, Isselbacher EM, et al. Surgery for Aortic Dilatation in Patients With Bicuspid Aortic Valves: A Statement of Clarification From the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. Feb 16 2016;67(6):724-731. doi:10.1016/j.jacc.2015.11.006
4. Hirshfeld JW, Jr., Ferrari VA, Bengel FM, et al. 2018 ACC/HRS/NASCI/SCAI/SCCT Expert Consensus Document on Optimal Use of Ionizing Radiation in Cardiovascular Imaging-Best Practices for Safety and Effectiveness, Part 1: Radiation Physics and Radiation Biology: A Report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways Developed in Collaboration With Mended Hearts. *Catheter Cardiovasc Interv*. Aug 1 2018;92(2):203-221. doi:10.1002/ccd.27660
5. Patel MR, White RD, Abbara S, et al. 2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR appropriate utilization of cardiovascular imaging in heart failure: a joint report of the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. *J Am Coll Cardiol*. May 28 2013;61(21):2207-31. doi:10.1016/j.jacc.2013.02.005

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